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MINOR SURGICAL GYNECOLOGY

A TREATISE

OF

UTERINE DIAGNOSIS AND THE LESSER TECHNICALITIES OF GYNECOLOGICAL PRACTICE, INCLUDING GENERAL RULES FOR GYNECOLOGICAL OPERATIONS AND THE OPERATIONS FOR LACERATED CERVIX AND PERINEUM, AND PROLAPSUS OF UTERUS AND VAGINA

FOR THE USE OF

THE ADVANCED STUDENT AND GENERAL PRACTITIONER

BY

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SECOND EDITION, REVISED AND ENLARGED

WITH THREE HUNDRED AND TWENTY-ONE ILLUSTRATIONS

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PREFACE TO FIRST EDITION.

"Success in the treatment of the diseases of women lies wholly in attention to minute details."—(EMMET.)

EVERY recent text-book on the Diseases of Women contains a brief reference to the minor technicalities and manipulations commonly employed in the diagnosis and treatment of these affections. But the scope of a work which covers the whole vast field of gynecological science, does not permit the detailed discussion of many practical points which the student and practitioner should know, and is obliged to learn with many annoyances in the course of his practice. Nowhere, except perhaps scattered through periodical literature, can many of these topics be found, and nowhere can the experience, so dearly acquired after many attempts and failures, be more rapidly obtained except by a visit to one of the large medical centres in which practical gynecology is taught. Of course, no book can supply the knowledge gained at the bedside or operating-table; and no description, however minute, can enable the examining finger to distinguish between a retroverted uterus and a retro-uterine fibroid or pelvic cellulitis. But many an error may be avoided, and many a manipulation rendered easy for physician and patient, if the sources of possible error and the details of the manipulation be clearly laid before the operator. With this object this book has been prepared. Its necessity may not be apparent to the gynecological expert who, by years of practice, has familiarized himself with all the details of his specialty, nor to the interne of the Woman's Hospital, whose daily duty teaches him the very applications which are here described. For neither of these, be it distinctly understood, is the book intended. But I have been led grossly into error by the expressions of many general practitioners, and my experience as an instructor in practical gynecology is utterly at fault, if the student and young practitioner do not find in it many hints which will prove valuable to them in every-day life.

It is not a detailed account of larger operations which the general

practitioner needs—these he can study up for special cases, when such occur to him, or he will probably transfer them to some specialist, of whom there is nowadays no lack—but a knowledge of all the minute technicalities of local examination, digital and instrumental, and of the various manipulations and minor operations which he is liable to meet with every day. This information I have endeavored to supply in this book.

If at times the details seem to be too minute, and some of the directions apparently trivial, I beg the critic to remember that the necessity for such minuteness of description is based entirely upon my experience as an instructor in practical gynecology to at least one hundred general practitioners from all parts of the country.

In several chapters, notably those on applications to the vagina and endometrium, repetitions of the indications, agents, and dangers, were necessary to avoid frequent references to previous sections which might prove confusing.

The work has thus almost involuntarily assumed the character of a text-book, in which the author's views and experience are interwoven with the methods and opinions commonly accepted. As such, of course, it makes no claim to special novelty or originality, since many of the methods which I have here described as my own and have learned by accident or experience, may, unknown to me, be used by other gynecologists.

In accordance with the plan of this book, all references to literature and historical descriptions have, as a rule, been omitted. Only when a method was new, or the name of its author inseparable from it, has such mention been made. The Index of Authors, usually so serviceable, has for the same reason been omitted.

The illustrations have all been credited to their proper sources (at least such was my intention); those which are new and were prepared under my direction, are marked P. F. M., in parentheses. I have endeavored not to give the book the appearance of an instrument-maker's catalogue; but have found it unavoidable to insert many cuts of instruments in order to illustrate their construction, and give the reader an opportunity to choose for himself. In some instances old and familiar illustrations have been retained because (as in the diagram of the introduction of a sponge-tent, by Sims) it seemed impossible to improve on them.

Such errors, chiefly of a typographical nature, as exist, are believed to be due to the hurried proof-reading necessitated by the duty of bringing the book out in time for its regular place in the series.

The works of Hegar and Kaltenbach ("Die operative Gynäkologie,"

1874); Leblond ("Chirurgie gynécologique," 1878), and Chrobak ("Untersuchung der Weiblichen Genitalien, und Allgemeine gynäkologische Therapie," 1879), have served me as valuable guides.

I am under obligations to Messrs. Geo. Tiemann & Co., J. Reynders & Co., Philip H. Schmidt, F. G. Otto & Sons, and W. F. Ford, instrument-makers of this city, for the loan of numerous woodcuts.

If this book in any manner renders the study and practice of Gynecology more easy for the beginner, its object will be accomplished.

PAUL F. MUNDÉ.

20 West Forty-Fifth Street,
New York, December 1, 1880.

PREFACE TO SECOND EDITION.

The favorable reception of this work by the profession, when it appeared in Wood's Library for 1880, has induced me to give it a thorough revision, and to add to it, not only numerous interpolations and emendations, but also a new part, containing the rules governing gynecological operations in general, and a minute description of the operations for laceration of the cervix and perineum, and prolapsus of the uterus and vagina.

The particular object of this work being to supply the details of gynecological technique and practice, for which the more comprehensive textbooks cannot, or at least do not, spare the space, I found the task of writing a *complete* treatise on Operative Gynecology, in which each subject should be handled with the same minuteness, greater than time or strength at my present disposal permitted; and hence I have chosen, for the present, several minor operations which are now agitating the professional mind more particularly, and which bid fair to become more universally popular, leaving for a future time the preparation of a complete work.

I am aware that practical gynecology can be learned only by actual experience at the examining and operating table, and that a skilled touch cannot be acquired by reading the description of what the finger should feel in certain pathological conditions of the female pelvic organs. But, unfortunately, only a small portion of the profession can avail themselves of the clinical advantages offered by our hospitals and the new Schools of Practical Medicine springing up throughout our country. And even these fortunate ones need some guide, some aid to their memories when they attempt to apply in their practice the clinical teachings which they have received. It is all very well to tell a man to introduce a pessary, or dilate a uterus, or make an intra-uterine application, or even show him on the living subject how to do it, or indeed allow him to do it himself a few times. But he needs some means of refreshing his memory as to the details of these manœuvres—

of the size, shape, etc., of the pessary, of the indications and dangers of dilatation, and the methods and benefits of applications—when he returns to his home, perhaps in the country, where he has no one to consult or call to his assistance. For such men, then, and chiefly for those who cannot avail themselves of the clinical advantages referred to, this book has been prepared, as a means of starting them on the path of an increased knowledge of practical gynecology. To make experts of them is not my intention or expectation, but merely to teach them to treat female diseases carefully and intelligently, and do as little harm as possible.

A majority of the illustrations are new, having been drawn under my directions, partly with a view to presenting new diagrams to the reader, instead of the old, time-worn and hackneyed cuts which have been copied from book to book for the last generation. If at times perfect anatomical correctness has not been attained, it must be remembered that often it is impossible to depict all the desired conditions in a single drawing, and that therefore to be clear and distinct many cuts must be exaggerated and diagrammatical. Many cuts of instruments have been omitted for æsthetic reasons.

For valuable assistance in correcting proof, and for the compilation of the Index, Contents, and List of Illustrations, I am greatly indebted to Dr. B. Hughes Wells.

For the preparation of new cuts of instruments I am under obligation to Mr. Philip H. Schmidt, and for the loan of cuts of instruments to Messrs. Tiemann & Co., Reynders & Co., Otto & Sons, and W. F. Ford, instrument-makers of this city.

I can but hope that the work in its new, enlarged, and improved shape, with clear type, good paper, and distinct and novel illustrations, will meet with a proportionate increase of the favor shown to its predecessor.

PAUL F. MUNDÉ.

No. 20 West Forty-fifth Street,
New York, March 15, 1885.

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A TEXT-BOOK

OF

MINOR SURGICAL GYNECOLOGY.

INTRODUCTION.

GENERAL CONSIDERATIONS INFLUENCING THE DIAGNOSIS AND TREATMENT OF GYNECOLOGICAL CASES.

The practice of gynecology, owing to the inherent delicate character of the subject and organs which it embraces, is beset with difficulties and restrictions met with in no other special branch of practical medicine. While the physician will rarely find objection to an examination of the throat, eye, ear, lungs, or abdomen in either sex, he will very frequently encounter the most decided opposition to the desired and indispensable exploration of her genital organs on the part of his female patient—an opposition natural, of course, and entirely consistent with the inborn modesty of her sex, which every one is bound to respect. To overcome this opposition without injuring the sensitiveness of the patient is manifestly a delicate and difficult task, the accomplishment of which may often require all the tact and gentleness, combined with firmness, at the physician's command. It is this very difficulty of procuring a physical examination of the female genital organs which renders the practical study of the diseases of these organs so laborious, and requires nine-tenths of our medical students to go into practice without the slightest practical knowledge of this specialty. With auscultation and percussion, laryngoscopy and ophthalmoscopy, they have all had abundant opportunity to become familiar, since in such courses the number of participants need only be limited by the convenience of the teacher and the abundance of his clinical material; but the necessity of limiting a practical course on gynecology to one or two men naturally debars the great majority of students from taking part in such instruction, which is, moreover, not permitted in all public institutions. In this respect Europe is not superior to America—indeed, particularly since the establishment of the Polyclinic and Post-graduate Schools, I think the facilities for the study of practical gynecology are greater for the mass of practitioners and students in New York than in any foreign university city of my acquaintance.

Again, the peculiar situation of the female genital organs requires the education, chiefly, of the sense of touch as a means of diagnosis ; and this sense, while relatively and individually sufficiently capable of accuracy, is still not so absolute as are the senses of sight and hearing. A color or a sound will, as a rule, not be disputed ; but there may be very different opinions as to the degree of hardness or softness, of form or size of a body as detected by the examining fingers. It thus happens that equally eminent and experienced gynecologists may arrive at very dissimilar conclusions in a certain case, or that we may be unable to give a positive opinion on the nature of a tumor, or the existence of early pregnancy, without being to blame for want of practice or acuteness. And this may happen even though a tumor in the uterus be readily palpable ; if its position, or the rigidity or thickness of the abdominal walls should interfere with the examination, the latter is manifestly greatly obstructed. The student should therefore remember that, while his endeavor must be to acquire the greatest possible amount of tactile experience, he should avoid hasty examinations and conclusions in overconfidence in his well-trained finger.

Very frequently our diagnosis is necessarily doubtful or impossible, because morbid conditions of certain organs are not recognizable by the touch ; such as, usually, minor affections of the ovaries, tubes, and ligaments. In view of all these difficulties it is important that all the rational signs be carefully inquired into and noted, and even extraneous symptoms considered before making a diagnosis.

Gynecological manipulations may be greatly influenced by the age, physical condition, and temperament of the patient.

It very rarely becomes necessary to make a vaginal examination *before puberty*, because the diseases which call for such an examination seldom arise until after the inception of the menstrual function, and are, indeed, in by far the larger majority of instances, the direct result of parturition. A catarrhal inflammation of the vulvar orifice and a leucorrheal discharge are not uncommon affections in young girls, and may call for an ocular examination, but the suspicion or presence of a stone in the bladder is almost the only disease requiring a closer exploration of the ante-nubile female genitals. In retarded puberty, with regular menstrual molimen, an increase in size of the abdomen will excite suspicion of imperforate hymen or vagina and retained menstrual discharge, a suspicion only to be verified by examination. It should be borne in mind in such cases that there may be another cause for the abdominal enlargement and suppressed menstruation, and the physician should be careful not to allow himself to be misled by the statements of the patient or her friends, and thus overlook a possible pregnancy.

Young *single women* very frequently complain of menstrual disorders, chiefly dysmenorrhea, and present symptoms indicative of uterine or ovarian disease. If possible, an examination of a single woman should be deferred until an attempt has been made, by medicines and hygienic measures, to overcome her symptoms. Thus, in functional or ovarian dysmenorrhea, it may be possible to relieve all symptoms by such remedies as

the tincture of gelseminum, or pulsatilla, or apiol, or a laudanum enema or opium suppository, or a blister or iodine over the ovarian region. But in no case should this attempt, if unsuccessful after a fair trial, be allowed to conclude the treatment. If the symptoms still continue, a local examination should be proposed and gently but firmly insisted upon. If positively refused, the physician should consider whether it is fair to the patient and himself to continue treating her while he is in total ignorance of her disease, and whether it is not due to his reputation to decline her case unless she permits an exploration. He should reflect that by continuing palliative general measures for some time he may possibly secure the confidence of the patient sufficiently to gain her consent to an examination, or induce her relatives to overcome her scruples. If she should still persist in a refusal, he no doubt is justified in then putting before her his ultimatum of examination, or discharge from his care.

The necessity for a genital examination may become imperative in case of an unmarried woman presenting herself for menstrual suppression, when the physician employs the precaution of palpating her abdomen through the clothes and finds there an enlargement and a tension which leads him to suspect pregnancy. In at least a dozen cases have I thus found it necessary to insist upon a genital exploration in apparently perfectly innocent young girls, and found a pregnancy advanced to five months and more. Although a menstrual suppression of a few months is not unusual in single women, frequently as the result of a change of climate, I never, in cases of suppression, neglect the above precaution of a superficial palpation of the abdomen through or under the clothes while the patient is standing before me, and only when I find no enlargement do I defer or entirely omit a vaginal examination.

The absurdity of omitting a local examination, if it be only an inspection of the external genitals, whenever general remedies fail to remedy the amenorrhea, is well illustrated by two instances recently reported from a neighboring city, in which two young women of twenty-two and eighteen years respectively, had for five years or more been ineffectually treated by drugs for retarded puberty, until at last, in desperation, they consulted a more intelligent physician, who insisted on an examination, and found both sisters (*sic*) to be hypospadiac males.

In a *virgin* the presence of the hymen will, as a rule, limit the examination to the digital per vaginam and rectum, or, if the hymen be very rigid, and its aperture unusually small, a vaginal examination may be impossible, and that per rectum must be substituted. In certain cases of importance or emergency it certainly is justifiable to examine, even at the risk of rupturing the hymen, as when the introduction of a pessary is necessary or the presence of a cervical catarrh or erosion is suspected.

As a rule, a local exploration is to be avoided during the *menstrual period*, not, be it understood, because indagation or the speculum would be likely to injure the patient at that time, but because it is unpleasant to every woman to be seen and handled while she is soiled. There are occa-

sions, however, when it is advisable and even necessary to examine during the flow, as, for instance, when it is desired to introduce the finger into the cervical canal to detect the supposed presence of an intra-uterine growth, or in the occasional cases of so-called intermittent polypus, when the tumor appears at the external os during the menstrual flow, and is retracted in the interval. We should, however, never hesitate, on mere esthetical grounds, to demand and make an exploration when the persistence of the sanguineous flow requires immediate diagnosis and treatment. Operative procedures, it need scarcely be said, are not to be undertaken during or near the menstrual epoch, with, perhaps, the exception just mentioned, when a persistent menorrhagia requires to be checked at once by tamponing the vagina, by the introduction of styptics into the uterine cavity, or by the removal of the exciting cause (vegetations, polypus, fibroid). The appropriate time for operations on the female generative organs is in the interval between two or three days after the flow and the week before the next period. The danger from hemorrhage, which has deterred surgeons from operating near the menstrual period, has, according to Simon, of Heidelberg, been greatly exaggerated, for this eminent surgeon even advocated that period as a favorable one for plastic operations on the ground of the greater hyperemia of the tissues. That the prevalent idea is incorrect—that the occurrence of menstruation soon after an operation will probably prevent primary union—I have myself observed in a number of operations for lacerated cervix, in which the flow came on unexpectedly within several days of the operation and lasted a week, the stitches not being removed until several days after its cessation, when union was found to be perfect. As a rule, we must consider the occurrence of menstruation during convalescence from an operation on the genital organs as undesirable, if only for the reason that it prevents the usual cleansing vaginal injections so useful in plastic operations on the cervix, vagina, and vulva. The danger of preventing union by the oozing of blood between the fresh surfaces need scarcely be feared if the latter are properly approximated by the sutures.

An almost universal impression prevails among the female sex that the genital organs should under no circumstances be washed during menstruation. While it certainly is advisable to avoid the risk of either suppressing or increasing the flow by cold or hot ablution of the genitals, or by cold or hot baths, respectively, daily washing of the vulva with *tepid* water is not only unlikely to do harm, but would be both pleasant and salutary from the point of cleanliness.

Pregnancy, and, particularly, *the puerperal state*, will counter-indicate all local operative procedures in a far greater degree than the menstrual period. While it is true, according to observations recently published by Verneuil and Mann, that pregnant women bear even severe operations on other parts of the body with remarkable toleration as regards their pregnancy, it nevertheless is not advisable, except in cases of urgent necessity, to use the knife in the vicinity of the genitals at that time. Such cases of necessity are the encroachment on the pregnant uterus of a rapidly grow-

ing ovarian tumor, when paracentesis, or the removal of the tumor, may become necessary, and have been repeatedly successfully performed without interrupting the gestation; further, the constriction of the cervical orifice by cancerous disease, when the removal of the cervix is indicated; the removal of a polypus with deep-seated pedicle, which might interfere with the passage of the child's head; the removal of vaginal or labial growths, which might otherwise obstruct parturition. The period during pregnancy when such operations are to be performed will generally depend on the urgency of the case.

Intra-uterine fibroids, which might interfere with parturition, are manifestly not amenable to treatment during pregnancy; in such cases the induction of premature labor, or, if too late, Cesarean section, are the only alternatives. I recently had occasion to enucleate a large interstitial fibroid weighing three pounds from the cervix and body of the uterus through the vagina during labor at the sixth month, the woman recovering without a bad symptom. Such opportunities, however, are rare. Minor operations, such as laceration of cervix or perineum, prolapsus vaginæ, should be deferred till after puerperal convalescence, since the freshly united surfaces would probably part during the expulsion of the child. While the above operative procedures may interrupt the pregnancy, as happened to me after amputation by the galvano-caustic loop of an enormous epitheliomatous cervix during the fourth month, marked exceptions may occur, as in a case of operation for lacerated cervix where I assisted a friend, and it was not discovered until some time after the successful result that the woman, at the time, was between two and three months pregnant. She went to term, twins were born, and the cervix was but very slightly torn. While this case must be looked upon as a lucky escape, and certainly not as an example to be followed, I have twice operated during the first half of pregnancy, once removing an epithelioma of one lip of the cervix, the pregnancy being unsuspected; and in a second case, a large elephantiasis of the labia and clitoris, without exciting abortion.

As a rule, it is advisable to abstain from excessive manipulation of a *pregnant uterus*. Thus pregnant women should be cautioned against using *hot* vaginal injections, and instructed to introduce the nozzle of the syringe carefully and but a short distance, and to employ tepid, perhaps slightly astringent, injections if the ordinary leucorrhea should be unusually irritating. The physician may occasionally be induced, for this same leucorrhea, to introduce medicated pledgets of cotton, or apply an astringent solution to the vaginal mucous membrane through the speculum; or, as recommended by Jones and Sims, apply nitrate of silver to the eroded cervix, as a cure for obstinate vomiting; but all these procedures should be conducted with unusual caution, and with the constant remembrance that, however tolerant the non-pregnant uterus is, the impregnated organ will, with rare exceptions, brook but little interference. In making this statement I wish it distinctly understood that no *necessary* procedure should be neglected by reason of the pregnancy. Thus a woman who

becomes pregnant while wearing a retroversion pessary should continue wearing that or eventually a larger pessary until the advent of the fourth month has raised the fundus uteri above the sacrum and removed the danger of incarceration of the retroverted fundus. The same rule applies to the support of a replaced gravid uterus by a pessary, when the retrodisplacement did not occur or call for relief until after conception and enlargement of the uterus. Likewise, a woman with a protruding rectocele, which has become chafed and eroded by friction against her clothes, should not be compelled to forego the comfort afforded her by a suitable ring pessary or the daily introduction by the physician of an astringent tampon, simply because she is pregnant. Gradually, as the uterus rises, the vagina becomes stretched upward, and the rectocele disappears.

During the *puerperal state*, operations should be entirely avoided, always excepting, of course, the immediate closure of a perineal rent. The greater tendency to septic infection at that time, and the dilated condition of all the pelvic blood-vessels, are sufficient reasons for this rule. After eight or ten weeks, when puerperal convalescence has become fully established and genital involution has taken place, no counter-indication to an operation exists on that score. *Lactation*, however, may prove an obstacle in the influence which anesthesia, excitement, and perhaps suppuration may have on the secretion and quality of the milk. Operations which by the quiet or position entailed by them interfere with the convenient application of the child to the breast (ovariotomy, perineorrhaphy) may need to be deferred until that function has ceased; but an operation like that for lacerated cervix does not, in my opinion, interfere in any way with nursing, and need not, therefore, be postponed if its speedy performance is at all desirable. In cases, however, where the injury produced during labor was so great as to seriously inconvenience the patient and retard her convalescence, as in severe perineal laceration with uterine descensus, I do not consider lactation a counter-indication to an operation as soon as involution has taken place. I have thus operated several times on lacerations through the sphincter ani, where the alvine functions were interfered with, in the third month after delivery, using no precautions except not to apply the child to the breast for eighteen to twenty-four hours after the operation, when the anesthetic had been entirely eliminated; and in no case was lactation interrupted, the child injured, or complete union interfered with.

A pessary may very often require to be introduced before the lying-in woman leaves her bed, in order to prevent the formerly displaced uterus from returning to the abnormal position which it occupied before the last pregnancy; indeed, the rectification of the displacement at this time, when all the sexual organs are undergoing a process of involution, offers one of the best chances of entirely curing the patient. I have thus applied a retroversion pessary on the eighth day after delivery, removing it after two months, and found the uterus permanently replaced.

The *temperament* of the patient may influence the feasibility or advisability of an examination or operation very materially. A nervous,

excitable, or hysterical woman will require to be treated with vastly more gentleness, persuasiveness, and, at the same time, decision, than a quiet, sensible patient, in order to secure her consent to an examination or operation. Some patients are so excited by every examination or local treatment, as to necessitate the cessation of the treatment, finding that the local benefit is more than counterbalanced by the general excitement. Thus, I have one patient in whom the mere introduction of the sound produced such general nervous excitement for several days, that I dared not repeat the manœuvre, and have, in fact, been compelled to desist from all local treatment for the same reason. The physician should carefully discriminate in such cases, and not be misled into considering his manipulations as the cause of the psychical symptoms when they are really the effect of the sexual disorder. Neither should he persist in the local treatment, if he finds it counter-indicated by the nervous symptoms. Many patients shrink from the mere word "operation," as they would from a pestilence; therefore, always qualify your statement that an operation is necessary by omitting that word, and speaking of "closing up" or "sewing a tear," for instance, until the patient has become accustomed to the idea. Many a patient have I in past years frightened away by incautiously telling her that an "operation" would have to be performed.

In the same class of patients the question should be considered whether the administration of an anesthetic is advisable, and whether the operation will be likely to increase or diminish the mental symptoms. If the fear of the operation is so great as to arouse permanent mental disturbance, of course it must be postponed or given up. On the other hand, we may often hope for an improvement in the psychosis from the operation, even though the lesion for which the latter is performed cannot be looked upon in the light of its cause ; as, for instance, the removal of cicatricial tissue at the perineum, and the closure of a gaping vulvar orifice, which had produced marital infelicity, sterility, and melancholia on the part of the wife, or the excision of a cicatricial plug from a cervical rent and closure of that rent, which had induced general and cerebral anemia with its concomitant neuroses. The moral effect of an operation should also be taken into account in forming an indication, although too much stress should not be laid on this reason to the overshadowing of the physical condition. No doubt much good might be done by the judicious and discriminating operative treatment of female insane patients whose genital organs display some defect curable by operation, provided the case be not of too long standing.

As regards the advisability of administering an anesthetic in operations which are ordinarily comparatively painless, or which last but a few moments, I have in the course of years arrived at the conclusion that, as a rule, the shock to the nervous system of even a moderate amount of pain and the dread of suffering are entirely out of proportion to the inconvenience and expense of, and subsequent nausea from, the anesthetic. Hence I now seldom perform a minor operation on the female genitals, such as curetting, discision of the uterine canal, the application of a strong caustic

like nitric acid or the actual cautery, or trachelorrhaphy, without an anesthetic, operating, of course, at the patient's residence. Only where organic disease of the heart or lungs renders anesthesia hazardous, would I perform the above operations on a conscious patient.

The *advanced age of a patient* should not deter us from insisting on an examination whenever it may appear desirable. Particularly should women be taught that the climacteric age, while not in itself serious or dangerous, still has been found by experience to be especially favorable to the development of malignant disease ; and that, therefore, the slightest derangement, the least excess of menstrual flow or leucorrheal discharge may be the first indication of serious or fatal disease, which can only be detected by an examination, and whose only chance of cure consists in that examination being as early as possible. Neither should the age of a patient deter us from an operation which appears justifiable either through the inconvenience or danger of her disease, the inability of relieving her by other means, or the hope of prolonging her life. Ovariotomy has been successfully performed after the seventieth year. In cases of prolapsus uteri, however, it may be questionable whether it is worth while, in view of the usual merely temporary results following the operations for that deformity, to subject a patient of over sixty years to the operation. If a bandage or contrivance can be found which will retain the organ within the vulva, an operation is scarcely called for. However, the decision will depend on the features of each individual case.

The peculiar situation of the internal female organs of generation, the large networks of vessels surrounding them, the sensitive character of the connective tissue in which they are encased, and chiefly the proximity of the peritoneum, render their examination and treatment a matter of difficulty and danger. It should be remembered that, while the uterus has the reputation, and justly so, of being the most patient and the toughest organ in the body, it or its surroundings will at times respond severely to the slightest interference. While one uterus will bravely bear the application of concentrated nitric acid to its interior or the excision of a fibroid from its wall, another will react acutely on the introduction of a sound or even bimanual palpation. While one peritoneum will not mind the separation of adhesions and the contamination of putrid ovarian fluid, another will respond by a furious inflammation to the slight tension exerted on it while drawing the uterus down to the vulva. All this should be borne in mind in stating the dangers of an operation. Furthermore, we should consider that the previous existence of chronic or subacute peri- or parametric inflammation renders the parts vastly more liable to a return of such inflammation, the extent of which cannot be foreseen. As a rule, the presence of evidences of previous inflammation of the peri- or parametrium should be looked upon as a counter-indication to active operative measures or to irritating applications to the uterus, and all inflammatory residue should be removed or rendered inert (cicatricial) by appropriate treatment before a new operative procedure is ventured upon.

The proximity of the bladder and the rectum may also serve to com-

plicate gynecological measures. The position of the uterus varies physiologically with the fulness or emptiness of the bladder and rectum, and the necessity for evacuating the contents of both these organs at stated intervals naturally interferes more or less with the process of restoration after operations on these parts. Thus, the catheter needs to be passed regularly, or the urine allowed to flow over a freshly united perineum, which latter occurrence has long been supposed to prevent union; more recent experience has shown, however, that healthy urine does not interfere with the healing of fresh wounds—witness lithotomy wounds. Then, the passage of firm scybalous masses may sunder a freshly healed perineum. Inflammatory edema, after operations on the genitals, may extend to the urethra and cause retention of urine; or the introduction of purulent matter into the bladder on the catheter may produce cystitis. The constant rhythmic motion of the uterus and anterior vaginal wall with each inspiration and expiration may annoy the inexperienced operator, and great difficulty is often met with in separating the lax, rugous walls of the vagina sufficiently to gain a clear view of the field of operation. Great compensating advantage is gained, on the other hand, in precisely such cases, as indeed in all where the normal mobility of the uterus is preserved, by the possibility of drawing the uterus with tenacula down to the vulva, and thus bringing it within easy reach of the operator.

These general remarks on the peculiar features of gynecological technics might be largely extended, but other special points will be referred to in the separate chapters. In closing this section, I will merely impress upon the practitioner and embryo gynecologist this one cardinal rule: Never omit to make a vaginal examination whenever the symptoms point in the least degree to possible disease of the sexual organs; consider, that it is as unscientific and irrational to attempt to diagnose or treat sensibly an affection of these organs without a thorough examination, as it would be in the case of the lungs or any other portion of the body. This caution will not appear unnecessary to those members of the profession who, as I do, frequently meet with cases of long-standing uterine disease, which have been treated (Heaven save the mark!) for years and years by general practitioners without a local examination ever having been proposed.

PART I.

GYNECOLOGICAL EXAMINATION.

1. VERBAL EXAMINATION.

When a female patient consults a physician in general practice the probability is that the latter will inquire into her symptoms without special reference to any set of organs, and, having no specialty, will treat her by general remedies to the exclusion of the very means which her condition requires. On the other hand, the specialist in uterine disease is too prone to ignore the influence of derangement of other organs on the sexual system, and to look upon the uterus and ovaries as the fountain-head of all other diseases in the female sex. Both parties are manifestly in the wrong ; the general practitioner who treats a leucorrhea, arising from lacerated cervix and endotrachelitis, by iron and simple cleansing injections, or the sacralgia of a retroverted uterus by a plaster to the back ; and the specialist who attempts to check a menorrhagia dependent on plethora of the portal system by intra-uterine styptics, or cure the amenorrhea of chlorosis by local irritants. Both the too general and the too specialistic course should be avoided, and, in taking the history of a patient, all the signs should be carefully noted which are in any way abnormal or point to the possible seat of disease. In no case should the gynecologist persist in attributing all the constitutional symptoms to the sexual organs when a careful examination has failed to show him any distinct sign of disease in those organs. The determination of the precise amount of influence of an areolar hyperplasia of the uterus, or so-called chronic metritis, in the production of the peculiar neuroses and psychoses so frequently met with in that common affection will, in my opinion, prove one of the hardest tests of his discrimination and judgment in this respect.

For the benefit of those gentlemen whose tendency toward some other than the gynecological specialty might lead them to overlook the existence of uterine disease, I will refer to two highly instructive cases which have come under my notice within the last few years. In one, the young lady, after a severe fall on her nates, began to show signs of mental derangement, which gradually developed into settled melancholia ; after no improvement from a six months' stay in a celebrated institution in a neighboring city, she consulted one of our rising young neurologists nearer home, who again failed to relieve her. Finally, acting on the advice of

some friends, she consulted a notorious female irregular, whose "specialty" is female diseases. The inevitable examination followed, a retroversion was readily detected, the uterus replaced and retained by an ordinary pessary, and lo and behold! in three weeks the lady's melancholia disappeared, and she returned home well; of her continued good health I myself am a frequent witness. The other case was that of a lady confined to her bed for several years by an apparent paresis of the lower extremities, for which various celebrated neurologists had treated her in vain. She chanced to fall into the hands of one of our younger gynecologists, who suspected possible uterine disease, examined, found a retroflexion, replaced the uterus, introduced a pessary, and in a few days the paralytic patient walked!

In taking the history of a female patient complaining of sexual disease the physician should, following the usual inquiries after name, age, residence, nationality, ascertain the occupation of the patient, whether it is very laborious, or the contrary, whether it is such as is likely to exert any particular influence on the sexual organs, such as the habitual use of the sewing-machine. Further, he should inquire if the patient is married, if so, how long, how many children she has had, how many miscarriages; how long since her last confinement or miscarriage; whether all her labors and gettings-up were easy and natural; whether instruments were used; how long she has been in poor health; what diseases she has had; whether her parents were healthy. He should then inquire about her menstrual function, at what age it first appeared, whether it was always regular, its duration and character, its freedom from pain, or the reverse; when it last occurred. The last question should never be omitted, as there can be no doubt that many a sound has been hurriedly passed, and an abortion thereby produced, simply because the patient was not induced to tell that she had gone one, two, or more weeks over a menstrual period. True, the woman may intentionally make a misstatement on this subject; but then, at least, the physician is exonerated so long as the slight increase in size of the uterus does not enable him to detect the early pregnancy. The patient should further be questioned as to the seat, character, duration, and persistency of any pain she may experience; if she is married, as to whether coition is painful; whether she has a vaginal discharge, its amount, character, and duration; whether micturition is free, abundant, or painful; the condition of her bowels, whether regular, constipated, or painful; as to her appetite and digestion, and her general health; the presence of hereditary disease in the family; the suffering of the patient from chlorosis during her early menstrual life, or the previous occurrence of perimetric inflammation, are particularly important data. In old patients the time and character of the menopause should be inquired into.

In estimating the usually long array of symptoms presented by a patient suffering from sexual disease, it behooves the physician to take heed of any and all symptoms, no matter how apparently abstract, which his reading or experience have taught him may have a possible connection with the disorder for which he is consulted, and to endeavor to give them

their proper origin and value. The disorders of nutrition and innervation which occur so commonly in utero-ovarian disease as to be properly considered as more or less dependent upon it—the hystero-neuroses, to use the comprehensive and convenient term of Engelmann—are met with in almost every organ and tissue of the body, and in many cases, if still in their early stages, yield spontaneously with the improvement in the genital affection. Still, it will generally be found advisable, both as a comfort to the patient and a means of retaining her confidence, to treat such symptoms in other organs as seem to require special remedies. Such hystero-neuroses are: dyspepsia, chiefly belching, cardialgia, nausea, loss of appetite (a common accompaniment of ovarian congestion); tympanites; hemicrania, general cephalalgia, mammary, intercostal, and other neuralgiæ; the various hysterical symptoms, globus hystericus, general nervousness, hiccup, fits of laughing and weeping, convulsive actions, paralyses; cutaneous eruptions, acne, chloasma, eczema. A frequent occurrence is the enlargement and tenderness of the breasts during menstruation and uterine disease mainly just before the menstrual period, especially if the flow is scanty.

The symptoms which chiefly attract the attention of the physician to the pelvic organs are: sensation of weight or bearing-down, or falling in the abdomen and pelvis, a pain in the hypogastric, inguinal, or sacral regions; darting or radiating pains from the pubis down the thighs, or into the inguinal or hypochondriac regions; pain on defecation and micturition; dyspareunia; inability to take even moderately long walks or to go up and down stairs; pelvic pain on sitting; itching of the external genitals; leucorrhea; amenorrhea, or dysmenorrhea; meno- or metrorrhagia. To ascertain the approximate amount of blood lost the best way is to inquire how many napkins (provided she uses them) the patient soaks through every day. In estimating the value of leucorrhea as a symptom it should be remembered that, with the exception of cases of general anemia, it is merely a symptom indicative of more serious disease, and not the disease itself; also, that the character of the discharge, whether whitish, greenish, sanguineous, serous, ropy, or offensive, is of importance in indicating the seat and nature of the internal affection.

The importance of recognizing and appreciating the *significance of pain* as a means of diagnosis of pelvic disease in the female leads me to say a few words on this subject.

As a rule, pain in the lower part of the abdomen or the pelvis of a woman indicates that she is the victim of some functional or organic disorder of one of the organs contained in these cavities. It by no means follows, however, that pain in other portions of the body should not be referable to the pelvic organs. Pain in the suprapubic region generally denotes chronic or subacute enlargement (hyperplasia or subinvolution) of the uterus. If the sensation is spoken of more as that of motion, "as though a child were moving about in the abdomen," I have found it to indicate, with almost unerring certainty, the presence of hyperplasia or subinvolution of an aggravated degree. This peculiar sensation is probably a hystero-neurosis, although it may often be due to increased peristaltic

action of the intestines. Such action must, however, generally be irregular or spasmodic, since these patients are almost invariably constipated, which would not be the case if normal peristalsis were really increased. If the feeling is that of weight, weakness, or forward pressure, an anteversion or anteflexion, with or without moderate descensus, may generally be expected. If there is bearing-down, a feeling "as though everything were going to drop out," descensus, a prolapsus, or retroversion or flexion will probably be found, or a cystocele or rectocele may produce a similar sensation.

A dragging, aching pain in either groin, extending down the thighs, generally depends on prolapsus and retrodisplacement. Expulsive pains in the uterine region denote a desire on the part of the uterus to expel some foreign body, such as a fibroid, a detached ovum, retained menstrual fluid. Pain in the ovarian region does not always indicate disease of the ovaries, for it very frequently is of reflex character, depending on inflammation, laceration, or hyperplasia of the cervix. Still, when we find a more or less acute boring, often darting, shooting pain in that region complained of, we can generally expect to find the ovary enlarged and congested, or prolapsed ; in the latter case the pain is generally deeper-seated, and extends to each hip or sacro-ischiatic notch. If the ovaries are the seat of pain, the latter will be found to be aggravated just before the menstrual period.

Pain in the back, if in the lumbar region, generally has no direct connection with utero-ovarian disease. It may, however, possibly denote in cystitis a spread of the catarrhal disease up the ureters to the renal pelves.

If in the sacrum, however, the pain generally gives rise to a suspicion of a retrodisplacement of the uterus, or of prolapse of one or both ovaries ; or an acute, subacute, or (so-called) chronic perimetric inflammation. In the latter class of cases it by no means follows that the plastic exudation is of great amount, forming an actual tumor ; while, as a rule, the sacralgia increases in proportion to the size and extent of the exudation. I have seen more diffuse infiltration and cicatricial induration of the retro-uterine cellular tissue and peritoneum accompanied by the most intense, continuous sacral pain. In some cases nothing but a diffuse, boggy condition of the retro-uterine tissue will be found to account for the pain, which may, perhaps, be looked upon as edema of the cellular tissue, or subacute sacral periostitis. Recent observations lead me very much to believe that a subacute or chronic inflammation of the lymphatic glands and vessels of the pelvic cellular tissue—an adenitis and angioleucitis—is the true pathology of many of these cases. They certainly are exceedingly obstinate to treatment. Very frequently nothing whatever will be found to account for the sacralgia, which we are then forced to consider a veritable reflex neuralgia proceeding from a hyperplastic uterus or congested ovaries, and which is often benefited by counter-irritant applications to the skin of the sacrum and lumbar region. Occasionally the "backache" is lower down toward the coccyx, and will be found to depend on a catarrhal inflammation of the rectum. Pain on defecation may be caused by a retro-

displaced inflamed uterus or ovary (particularly the latter, when the pain lasts for some time after the passage), or by an ulcer in the rectum, or by a fissure at the anus, or by hemorrhoids.

I have met with a number of cases in which the pressure of the hard cervix of a hyperplastic and partly prolapsed uterus on the posterior wall of the vagina caused severe pain near the junction of the sacrum and coccyx. Occasionally the coccygodynia is due to dislocation, or anterior anchylosis of the coccyx; in some cases caries or necrosis of the bone is present, and in others there appears to be a simple neuralgia of the bone.

A peculiar pain in the hip, somewhat above the ischiatic notch, is frequently indicative of ovarian disease; a blister over the painful spot may, however, relieve the pain and prove it to be merely sciatica.

Pain in micturition, if it be of a scalding character, generally indicates acute cystitis or urethritis, or a highly acid state of the urine, which is often due to cold and requires merely warmth and diluent or alkaline drinks to cure it; if spasmodic (tenesmus) there may be a fissure or caruncle of the urethra, or merely a hyperesthetic condition of the circular fibres of the neck of the bladder induced by chronic cystitis. The latter condition is particularly distressing and obdurate. Prolapse of the floor of the bladder (cystocele) or sacculation of the urethra (urethrocele) may also give rise to pain and delay in micturition.

Frequent, not painful, micturition, chiefly during the day-time and when the patient is on her feet, may be due to a slight exposure to cold, or to too active or prolonged exercise, but if it persists longer than a few days it will generally be found to be dependent on anteversion, anteflexion, or antecurvature of a more or less enlarged uterus. The influence of nervous excitement in producing enuresis should, however, not be forgotten. One of my patients always suffers from intense tenesmus of the bladder for several days after coition, which act, therefore, is torture to her. As she has an anteversion, the cervix being attached by adhesions to the rectum, and a chronic ovaritis, the vesical irritation is, no doubt, produced directly by the forcing back of the cervix, and sharp tilting forward of the fundus on the neck of the bladder during each intromission.

Pain in the vulva generally means some inflammatory or ulcerative condition of the labia or introitus vaginæ, such as simple vulvitis, or folliculitis vulvæ, or inflammation of the Bartholinian gland, or chancroid or some other injury or disease. It should lead us always to inspect the vulva before proceeding to indagation.

Pain in the legs, if down the anterior aspect of the thighs, may denote downward or forward displacement of the uterus; if down the back of the thighs, retrodisplacement of uterus or ovaries, or cellulitic deposits, which exert pressure on the sacral nerves. I have recently seen a lady, who was referred to me by one of our most distinguished neurologists, under whose care she had been for "spinal irritation," in whom every examination produced the most peculiar symptoms of reflex neuralgia; passing the finger through the vaginal introitus caused pain in both thighs, chiefly when a sensitive hymeneal caruncle near the navicular fossa was touched, and

friction of the cervix with the finger excited pain in and contractions of the sphincter ani. Retraction of the perineum with Sims' speculum was followed with so severe pains and apparent loss of power in both legs as to render her almost unable to walk for several hours. No doubt the hyperesthetic condition of the lower portion of her spinal cord had something to do with these phenomena.

Pain in the intercostal spaces very often depends on ovarian disease, and is more frequently connected with the left ovary, and therefore also met with as cardialgia. Hemicrania (migraine) and pressure on the vertex and occiput are very commonly met with in connection with menstrual disorders, or occur at the time of menstruation, particularly if the flow is scanty.

Pain in the epigastric region is one of the commonest symptoms in uterine disease next to the local signs. It shows the intimate relation between the sexual and the digestive organs, and generally depends on functional derangement of the stomach. Vomiting is less frequently met with —nausea more so—and should lead the physician to inquire particularly about the time of the last menstruation and suspect pregnancy, especially if it occur chiefly in the morning. In some patients nausea and vomiting are caused by pressure on a congested or inflamed ovary. I have thus repeatedly produced it at will.

Pain is very often changed or aggravated by walking, standing, lying or sitting down. This is particularly the case in displacements (even in anteflexions in young girls the suprapubic pressure and discomfort is increased thereby) and pelvic inflammation. An increase of pain in sitting down would indicate that pressure was exerted on an organ in that position, and not in the erect posture; thus a prolapsed and congested ovary would naturally be squeezed between the uterus and pelvic wall, by the downward pressure of the intestines in the sitting posture—I have such a case in mind—or an inflamed, carious, or hyperesthetic coccyx, or prolapsed and inflamed hemorrhoid would manifest itself by pain chiefly when pressure is made directly upon it when the patient sits down. Again, a patient with an inflamed ovary, or an acute pelvic exudation, would not be able to lie on the affected side, because the pressure of the superincumbent viscera increases the pain.

I have already stated that pain as a diagnostic symptom of utero-pelvic disease is of great value. Still, it is by no means implicitly to be relied upon, and should be utilized only as an auxiliary or guide to diagnosis. Thus, I have frequently found women who complained of the most acute abdominal, sacral, and general pain, present absolutely nothing but a moderate hyperplasia uteri (these pains were evidently hystero-neurotic); and again patients with scarcely a local symptom have surprised me by the discovery of a severe displacement, laceration, or even malignant disease. The peculiar character of the pain is also misleading; thus, I recollect one case of a woman who consulted me for a constant sanguineous discharge, saying that she had expulsive pains like labor pains. I remarked to my students that a continual sanguineous flow in a woman of her advanced

age would lead me to suspect malignant disease, but that the expulsive pains were much more characteristic of fibroid, probably a polypus. An examination, however, revealed a large epithelioma of the cervix.

Pain during menstruation is very common, particularly in unmarried women and nulliparæ. If occurring before the flow, it generally denotes ovarian congestion, if at the inception of or during the flow some obstruction to the free discharge of the blood, such as constricted cervical canal, or flexion. Since the majority of women experience more or less local and constitutional discomfort immediately preceding, and less frequently during the menstrual flow, the physician must be guided by the intensity of the symptoms in deciding on the necessity for treatment. A very peculiar pain occurring about the middle of the intermenstrual period is not unfrequently complained of; it closely resembles that experienced by the same individual at the regular epochs, and is generally accompanied by increased genital secretion. It has been called by Priestley, who was one of the first to describe it, "intermenstrual dysmenorrhea," and appears to depend either on intermediate ovulation or on inflammatory exacerbations in the ovaries. It is frequently accompanied by anteflexion and chronic pelvic peritonitis, and I have seen one case in a virgin in which there was merely a slight descensus uteri, the relief of which by a pessary entirely removed the pain.

The causative agencies of the symptoms ascertained during a verbal examination should be carefully inquired into under the head of general or predisposing, and direct or local causes. The predisposing consist of previous ill-health, hereditary tendency, over-exertion, too frequent labors and too early gettings-up, masturbation, tight lacing, confining or peculiarly injurious work (sewing-machine), too luxurious life, etc.; the direct, of local injuries by parturition, criminal abortion, too frequent or unnatural coition, injections, pessaries, cauterization, exposure to cold or sudden violence, and particularly the puerperal state.

To guard against omitting important points the physician will do well to follow a specified order in asking questions and learning the history of the patient, in which task he should endeavor to adapt himself to the patient's way of telling her story.

All the symptoms, local and general, having been systematically ascertained and noted, the physician should, if the information obtained warrants it, propose a vaginal examination with the precautions above specified.

2. METHODS OF LOCAL EXAMINATION.

The peculiar seat and character of the female generative organs requires for their examination methods and maneuvres, for the most part, entirely different from those employed in the exploration of other organs of the body. To be sure, we make use of the eye and the ear in this examination, but the special use of the finger, the speculum, and the sound, is peculiar to a gynecological examination.

The methods at our disposal for the local examination of the female generative organs are the following :

I. Non-instrumental Methods.

A. Inspection of the external genitals and abdomen.
B. Auscultation and percussion of the abdomen.
C. Palpation of the abdomen.
D. Digital examination ; *a*, vaginal ; *b*, rectal ; *c*, vesical.
E. Conjoined examination ; *a*, vagino-abdominal ; *b*, recto-abdominal ; *c*, vesico-abdominal.
F. Digital eversion of rectum.

II. Instrumental.

A. Exploration of urethra and bladder with catheter, sound, or endoscope.
B. Examination of the vagina, cervix, and external os with the speculum.
C. Examination of the uterus with the sound and probe.
D. Dilatation of the uterus for purposes of diagnosis.
E. Examination of the uterus with the blunt curette.
F. Artificial prolapsus of the uterus for diagnostic purposes.
G. Examination of the rectum with the speculum.
H. Mensuration of the abdomen.
I. Aspiration of pelvic and abdominal tumors.

It is evident that the greater portion of these methods will be unnecessary in the majority of cases, or that the order in which they are employed may be greatly modified by the necessities of the occasion. Thus inspection may be deferred till the last, or until the application of the speculum requires the exposure of the parts ; or auscultation and percussion are entirely unnecessary, or the vesical and rectal examinations are uncalled for. Dilatation of the uterus would manifestly be required only when more simple and ready means fail in establishing a diagnosis.

As a rule, the order of examination of a gynecological patient is the following : 1, inspection of the external genitals ; 2, examination with the finger and conjoined manipulation ; 3, introduction of sound ; 4, examination with the speculum.

As it is our duty to endeavor to gain as correct and complete an idea of our patient's condition as science and her physical and mental condition allow, it is always advisable, unless counter-indications (to be specified hereafter) exist, to employ all innocuous means in our power in making a diagnosis. For this reason, at a first interview, or as soon thereafter as practicable, the sound and speculum should be employed, even though they may not again be needed.

It is well to accustom one's self to a certain fixed routine of examination, but this routine should always be made to vary in accordance with

the results of previous statements and examinations ; thus we should not pass the sound, when we learn that the patient has skipped a menstrual period, or lacerate a hymen merely for the routine purpose of introducing the speculum.

A very excellent plan of dividing the methods of examination is that by the exercise of the senses, thus :

a. Examination by touch : palpation ; indagation and conjoined manipulation of vagina, rectum, and bladder ; introduction of the sound.
b. Examination by sight : inspection, mensuration, specula.
c. Examination by hearing : percussion and auscultation.
d. Examination by smell : the odor of vaginal discharges, indicative of infectious or malignant disease, or of communication with the intestine.

I have preferred to classify the methods as non-instrumental and instrumental, as most easy for systematic description.

It is needless to enjoin upon the examiner that the greatest gentleness, delicacy, and refinement are of paramount importance in making a genital examination, if he would avoid increasing the distaste which the patient naturally feels at the disagreeable necessity, and insure her submission to a repetition of the process. All unnecessary pain should be scrupulously avoided, and care taken to leave as little of an unpleasant effect on the patient's mind and body as is consistent with the accomplishment of the object. For this reason, instruments should be kept as much out of sight and hearing as possible, and blood-stains be carefully removed from the vulva, for fear of exciting suspicion and alarm.

Whenever practicable a diagnosis should be made at the first examination ; where this is impossible, as manifestly must occasionally occur, the patient should be told the reason, and a second or third interview solicited, until all doubts are removed. The diagnosis and, *eo ipso*, the treatment may depend on the result of a microscopic examination ; or the fulness of the bladder or rectum, or the excitable condition of the patient may preclude an immediate diagnosis ; or the imminence of the menstrual flow, or the presence of perimetric inflammation counter-indicate the exploration of the uterus.

The most favorable time for an examination is, as a rule, about the middle of the intermenstrual period, and the time of day one when the light is fair and the patient under as normal conditions as possible.

3. POSITIONS FOR EXAMINATION.

The examination of the female genital organs may be undertaken in various positions : *a*, dorsal recumbent ; *b*, lateral ; *c*, latero-abdominal ; *d*, abdominal ; *e*, genu-pectoral ; *f*, erect.

The preference for one or the other of these positions varies in different countries. Thus in England the left lateral decubitus is generally

chosen both for digital and specular examination; the French and Germans prefer the dorsal position for finger and speculum; and we in this country employ a combination of both positions, making the digital examination on the back, and then turning the patient to the left latero-abdominal position for the application of the duck-bill speculum. The majority of practitioners, however, introduce the cylindrical and bivalve specula on the back.

It is frequently of the greatest diagnostic and therapeutic utility to examine a patient in different positions, reference to which will be made under the various heads.

In all the recumbent positions but the latero-abdominal an ordinary couch, sofa, or bed can be made available; but for the examination in the latero-abdominal position a hard, perfectly level plane is essential. In all the positions, the nates should be brought down to the very edge of the couch, whenever practicable. In making a mere digital examination while the patient is in bed, this rule is, of course, generally disregarded.

a. Dorsal Recumbent Position.

There are several subdivisions of the dorsal position which all possess their utility and may come into play in any case. They are: the *level dorsal*, with head, shoulders, sacrum, and soles of feet on the same plane,

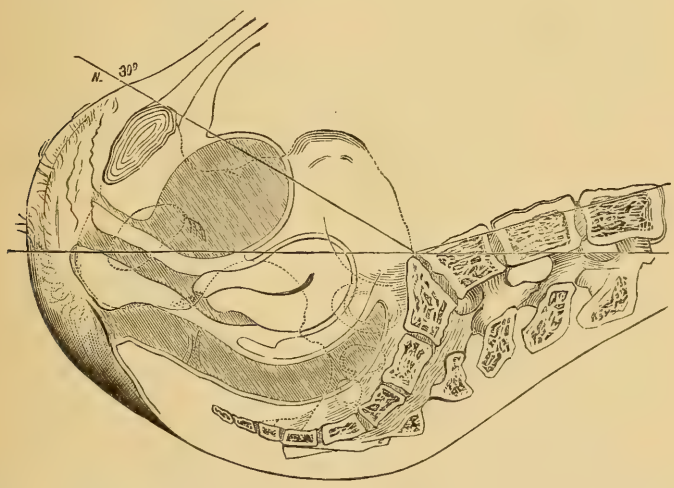


FIG. 1.—Dorsal Recumbent Position, with Extended Legs. (Hegar and Kaltenbach.)

thighs flexed nearly at right angles to abdomen; the *gluteo-dorsal*, with the thighs acutely flexed on the abdomen and the knees touching the thorax; the *lithotomy*, with the shoulders elevated, so as to approach the pelvis.

The *dorsal position, with legs extended*, I have not thought necessary to enumerate among the positions for a vaginal examination, as this procedure can only be very imperfectly performed in that position. The ne-

cessity for examining in that position will occur only in cases where absolute immobility of the body is imperative (as hemorrhage, violent peritonitis), or where the knees or hips are anchylosed. Under all other circumstances, no matter how inconvenient, the patient can at least flex the knees as in the regular position about to be described. The difference of position of the pelvis and sexual organs is seen by comparing figures 1 and 2.

For purposes of digital and bimanual examination the ordinary *level* dorsal position *with flexed knees* is the most convenient. Its employment by the majority of gynecologists proves this statement. In it the pelvic and abdominal viscera are at rest, and occupy as nearly as possible a horizontal position, gravitating neither downward, nor laterally, nor upward; the diaphragm exercises a minimum of displacing power on the

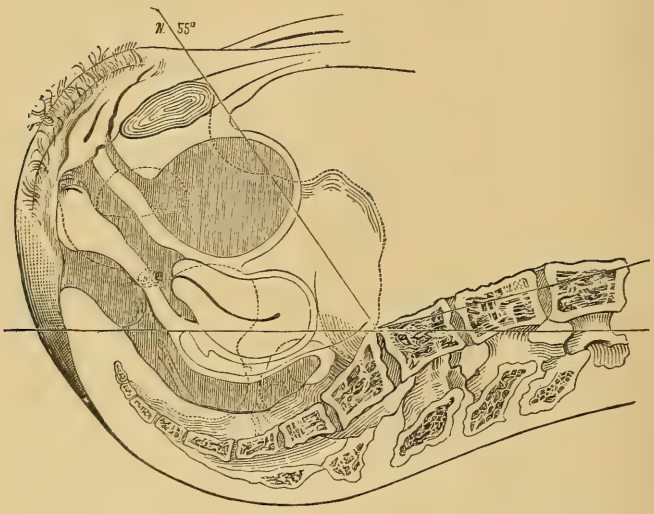


FIG. 2.—Dorsal Position, with Knees Flexed. (Hegar and Kaltenbach.)

viscera; the abdominal wall is relaxed; and we have the pelvic organs in as nearly a state of quiescence as we can expect to find them. One of the great advantages of the dorsal position, next to the probability of finding the pelvic organs in the most natural position, is the possibility of exercising abdominal palpation together with indagation.

The patient is placed on a flat, perfectly level couch, best a table, her head resting on a low pillow, her shoulders and sacrum on the same level, the nates close to the edge of the table, the feet close to and slightly external to the thighs, the knees widely separated. In case of need the knees may have to be kept asunder by assistants. In this position the pubis is the highest portion of the pelvis; it approaches the promontory of the sacrum, which rests on its middle portion; the vagina pursues a less horizontal, more downward direction, than in the flat dorsal (Fig. 1). The cervix is situated about on a line drawn through the tuberosities of the

ischium. Two lines drawn from the upper border of the symphysis and the posterior commissure of the vulva respectively, to the promontory of the sacrum, form an angle of fifty-five degrees.

In this position the abdominal parietes are more relaxed, and intra-abdominal pressure is more reduced than in the flat dorsal.

This position is undoubtedly the most convenient and practical for all ordinary examinations, and should always be employed whenever the necessary hard level couch is at hand. But it very frequently happens that we are obliged to examine patients in bed or on office-chairs, with head supported by pillows or cushions. The thorax is then approximated to the pelvis and a slightly different relation of angles between the symphysis, promontory, and lumbar vertebral column is established.

Intra-abdominal pressure is also somewhat increased, whence this position is inferior to that on a perfectly level plane. Any one who has endeavored to practise abdominal palpation when the thorax was somewhat

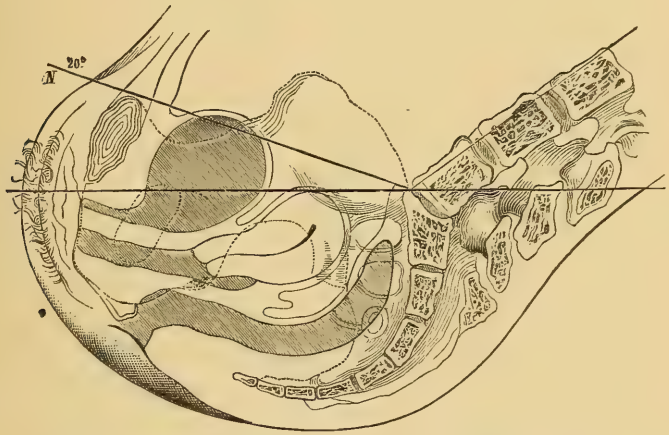


FIG. 3.—Dorsal Position—Lithotomy. (Hegar and Kaltenbach.)

elevated, as is usually the case in bed, will appreciate the difference. This position is rather more comfortable for the patient than any other, and in cases of no more than ordinary difficulty answers all purposes. The vagina has an almost horizontally backward direction, and the symphysis is elevated but slightly above the promontory.

These two positions suffice for all ordinary vaginal examinations. But cases are not uncommon in which the thickness or rigidity of the abdominal walls, the length of the vagina, or the rigidity of the perineum prevent a thorough examination. In such cases the dorsal position may be still further modified by putting the patient in the so-called *gluteo-dorsal* position (first systematically utilized by Simon), which consists in flexing the thighs of the patient to their utmost extent on her abdomen, so as to bring the knees almost in contact with the thorax, and separating the knees as widely as possible. The vulva should be at least at the edge of the table. Each leg is held by an assistant, who, if fatigued or desirous of using his

hands for sponging or other assistance, may place the knee over his neck. In this position the sacrum is raised, from the couch, the body rests on the upper portion of the sacrum, the symphysis is greatly elevated, and the promontory correspondingly depressed, the angle between the two being increased to fifty-five or sixty degrees. The vagina takes an almost perpendicular downward course, whereby the cervix is more easily reached per vaginam, and it, and the whole posterior surface of the uterus per rectum. The promontory also becomes more readily accessible to the vaginal finger, a fact worthy of remembrance in cases of prospective obstetric prognosis, when the length of the conjugate diameter is to be measured. The abdominal walls are greatly relaxed, intra-abdominal pressure much diminished, and palpation therefore facilitated. Still, care should be taken

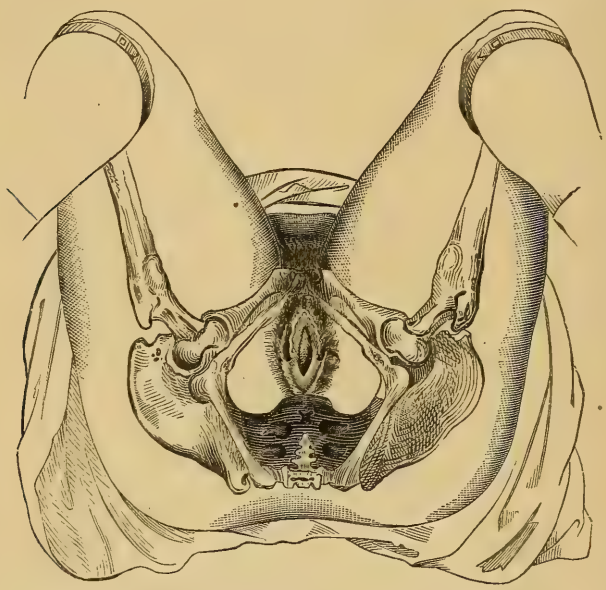


FIG. 4.—Gluteo-dorsal Position, Front View. (Hegar and Kaltenbach.)

not to elevate the thorax, or overdo the pelvic elevation, as the crowding together of the abdominal viscera would annul the gain first obtained. The anterior wall of the vagina, being almost perpendicular, becomes more readily accessible, even up to the cervix, to the finger and eye, a discovery which Simon utilized for the operation of vesico-vaginal fistula which he always performed in this position. His method is chiefly practised in Germany, but in this country the latero-abdominal (Sims') position has answered all the desires of the operator, and is so much less laborious to the assistants that it is scarcely likely to be superseded.

Still, there are cases of very fleshy women, with large, flabby, or cicatricially distorted vaginæ, in whom the gluteo-dorsal position affords a better view of the field of operation than the semiprone.

As a rule, it is well to remember that whenever a difficulty is experi-

enced in reaching the cervix or other pelvic organ, as frequently happens when the patient is in bed, the elevation of the pelvis, by increasing the flexion of the thighs on the abdomen (*i.e.*, by directing the patient to slip farther down in the bed, whereby the thoracic elevation is also diminished), or by putting the other hand or a cushion under the sacrum, will at once bring the desired part within reach.

Another dorsal position has recently been devised by Freund, of Strasburg, for his operation of abdominal extirpation of the entire cancerous uterus, and that is with the whole pelvis so much elevated as to swing free of the table, the knees being suspended in crutchlike supports fixed in the table; the body resting on the dorsal and cervical vertebræ. The object of this position is to gravitate the intestines away from the pelvis and thus freely expose that cavity.

For examination, I can imagine that it might be utilized for palpation in cases of small pelvic tumors with long pedicles, which were obscured by the superincumbent intestines; and also for the removal from the pelvic cavity of loose ascitic fluid simulating localized effusion or tumors. The stretching of the vaginal canal in this position would render it unfit for a digital examination.

b. Lateral Position.

The lateral position may be either right or left in accordance with the hand chosen for the examination. The left side is the one generally adopted, and the examination is made with the right hand. Barnes advises using the left hand, which to me appears inconvenient and awkward. Were I to use my left hand in examining on the side, I should prefer to have the patient on her right side. Examination on both sides may, moreover, occasionally be useful.

The patient lies on a horizontal plane, her head supported merely by a pillow; the hips down to the edge of the table; the thighs flexed at right angles to the body; the shoulders and hips perpendicular to the plane. In this position the pelvic organs maintain very much the same relations as on the back, but the movable abdominal viscera naturally incline toward the dependent side. The side position affords facilities for exploring the lateral and posterior portions of the pelvis (the right half of the pelvis being more accessible to the right index finger, on the left side, and the reverse), and may enable the examiner to detect a laterally prolapsed ovary, or slight perimetric exudation, or dislocated coccyx, which escaped his observation on the back. The lower portion of the rectum may also be examined by eversion from the vagina, or by the speculum.

Although bimanual examination is possible by passing the external hand between the thighs of the patient, it is obvious that it can neither be so convenient nor accurate as when the patient is on her back. The reason given by Barnes for preferring the left hand for indagation is that the right hand can be more *conveniently* (!) used for simultaneous abdominal palpation. The palpation of small abdominal tumors may be facilitated in the lateral position, by permitting the isolation of the tumor, if it be

situated on the uppermost side, or its grasping between the fingers of one hand, if it be on the dependent side. Thus, in a case of double floating kidney, in a parous woman, I was able to grasp readily the kidney of the uppermost side, as it was extruded by voluntary expiratory pressure from below the ribs, when in the dorsal position it was almost impossible to isolate the organs. It is also useful in percussing for free ascitic fluid.

For the ordinary purposes of diagnosis (except, perhaps, mere local inspection), the straight lateral position, in my opinion, is decidedly inferior to the dorsal, which, moreover, permits the use of either hand for indagation without change of position. It is also evident that whatever displacement of the pelvic organs possibly occurs on the side, is not usual to the patient, and can therefore but serve to confuse the diagnosis.

Nevertheless, the majority of English gynecologists persist in using the left lateral position, both for indagation and examination with the cylindrical and bivalve speculum.

c. Latero-abdominal Position.

Next to the dorsal, the latero-abdominal, or semiprone, position is unquestionably the most useful; not, however, for a digital examination, but for the employment of the speculum, and chiefly one particular speculum, the duck-bill of Sims.

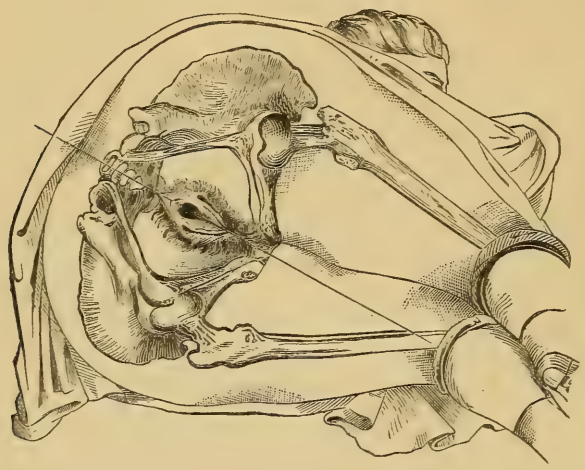


FIG. 5.—Latero-abdominal (Sims') Position. (Hegar and Kaltenbach.)

A digital examination can, it is true, be performed, and the other varieties of specula introduced quite as successfully (and more advantageously, as will be shown hereafter) in this position as in the straight lateral; but it is chiefly for the exposure of the whole vaginal tract by the duck-bill that this position is useful.

The patient lies on her side (right or left; the left is the one usually employed, and is recommended by the discoverer of this position, Sims, because the nurse can best hold the speculum with her right hand), on a

perfectly flat, hard table, the head on a low pillow, the lower (we will take the left) shoulder and that half of the thorax touching the table, the other shoulder but slightly raised from it, the left arm thrown out behind and hanging over the edge of the table ; the left hip touching the lower edge of the table, the right hip somewhat to the left in correspondence with the right shoulder, the thighs and knees flexed at right angles, the right knee slightly overlapping the left, the feet close together, projecting over the left corner of the table, and supported by the back of a chair or other article of furniture. In this position the woman lies partly on her side, and partly on her stomach, the abdominal viscera gravitate forward and downward away from the pelvic cavity ; the pelvis has a lateral and downward inclination, so that a line drawn from the coccyx through the rima vulvæ will strike the left popliteal space. The posterior vaginal wall is thus superior to the anterior, and the uterus sinks downward and forward. Intra-abdominal pressure is, to a great extent, suspended. By admitting air into the vagina in this position a counter-pressure may be made to the intra-abdominal pressure ; and any force still exerted by the latter will be entirely neutralized.

For ocular examination this position is unrivalled, and for instrumental and operative measures on the vagina and cervix almost indispensable. Whenever Sims' position is mentioned in this work, the left semiprone position is intended. While a hard table, merely covered with a blanket, or tightly upholstered, is undoubtedly the best couch for this position, and the examination is facilitated by giving the table a lateral and downward inclination toward the lower side and head of the patient, a tolerably satisfactory examination may be made on a firm, level sofa, or bed, which does not allow the hip to sink in to the level of the vulva. The table should be so placed that the light falls directly upon the vulva over the right shoulder of the operator ; the table will therefore occupy a diagonal position before the window.

d. Abdominal Position.

This position is useful to the gynecologist only in so far as it enables him to examine the spinal column and the posterior aspect of the pelvis, for any abnormalities which may affect the diameters of the pelvis or the position of the internal genital organs.

e. Genupectoral Position.

The patient is placed on a hard, level couch, her head so turned as to rest on one side of the face on a low pillow, her shoulders and upper thorax directly touching the couch, her thighs at right angles to the pelvis, the knees and hips close to the edge of the table, the feet slightly projecting over the edge. In this position the body rests on the upper portion of the thorax and the knees, the pelvis being very much higher than the thorax.

The sacrum is then the highest point, its anterior surface looks downward and forward, the symphysis is but slightly lower than the promon-

tory, but the downward inclination of the lumbar vertebral column is a very rapid one. The anterior wall of the vagina is nearly horizontal, the cervix uteri points toward the sacrum, the fundus downward and forward following the general direction of all the pelvic and abdominal viscera. Intra-abdominal pressure is entirely suspended, and if air enters the vagina by suction (as occurs with a gaping vulva), or is allowed to enter through a speculum, a positive counter-pressure or *vis a tergo* is added to the *vis a fronte* of gravitation. The vagina becomes elongated by the traction of the anteverted uterus, and if air enters is expanded like a balloon and every part becomes readily visible.

For purposes of digital examination this position is obviously unfitted through the elongation of the vagina already mentioned. It is mainly useful as a means of replacing a dislocated, chiefly, retrodisplaced uterus,

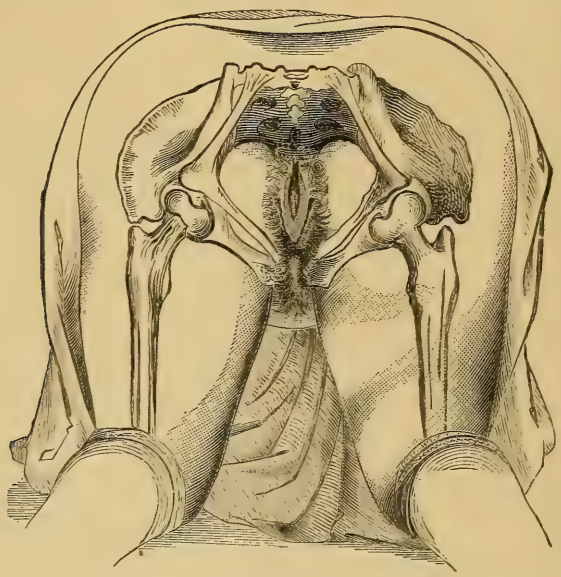


FIG. 6.—Genupectoral Position—Posterior View. (Hegar and Kaltenbach.)

especially if the fundus has become impacted in the sacral excavation and resists digital replacement on the side. The prolapsed uterus or ovaries, and small incarcerated fibroid or ovarian tumors with long pedicles, are also most easily replaced in this position, either spontaneously or by manual pressure.

To determine the length of the intravaginal portion of the cervix this position is invaluable. A cervix which appears greatly elongated, even to the vulva, will be no longer than normal when examination (sounding, indagation, and inspection) is made in the knee-chest position. A peculiar, microscopically as yet unfathomed, ductile condition of the uterus is the cause of this phenomenon. In the dorsal or erect position the uterus draws out like putty; in the knee-chest position gravitation causes it to

shrink. It is important to make this experiment in supposed hypertrophic elongation of the cervix and in prolapsus uteri.

Pessaries are also at times advantageously applied in this position, and applications of fluids made to the distended vagina. For operations the position is not generally available, as it is too uncomfortable to be long borne, and the administration of anesthetics is difficult, if not impossible in it.

Palpation is rarely attended with particular advantage in this position, since the weight of the abdominal walls on the palpating hand materially interferes with the perception of an intra-abdominal tumor. Still, occasionally the extent and manner of the downward displacement of the tumor may be detected by palpation and afford valuable information.

It is evident that the genu-*pectoral* position should not be confounded with its incomplete substitute, the genu-*cubital*, in which the upper portion of the body rests on the elbows instead of the thorax, and the downward inclination of the vertebral column is very slight. The essentially beneficial influences of the former, gravitation and suspension of intra-abdominal pressure are absent in the latter, and the genu-cubital position is useful only for the operation of certain cases of vesico-vaginal fistula which are not readily accessible in Sims' position.

f. Erect Position.

In the pelvis of a woman in the erect position the most dependent portion is the symphysis pubis, even the tip of the coccyx being slightly higher than the inferior border of the arcus pubis. The promontory is situated at an angle of 55° above the crest of the symphysis. The vulva points downward and very slightly forward, the vagina pursues an upward and backward direction ; the anterior vaginal wall is the first to meet the examining finger, the uterus has descended somewhat in the pelvis, the cervix generally backward, the fundus more than usually discernible through the anterior vaginal wall (this displacement occurs more markedly in parous women, though it is met with, to a slight degree, in nulliparæ) ; the anterior abdominal wall is tense and protrudes in the convex outline. In short, in accordance with the law of gravitation, involuntary intra-abdominal pressure is increased to its maximum. Deformities of the spinal column (particularly lordosis and kyphosis) ; excessive obliquity of the pelvis, whereby the promontory and symphysis are placed almost in a perpendicular line ; relaxation or diastasis of the abdominal muscles, abdominal tumors, displacement of the uterus or vagina, will, of course, alter more or less the above relations.

Since the symptoms complained of by women suffering with uterine disease are usually most intense, while the patients are on their feet, walking or standing, it is self-evident how important it is to ascertain the condition of the presumably diseased organs in that position. A digital (and even ocular) examination of the genitals is therefore important in many cases, particularly displacements, in order to ascertain the actual amount

of displacement during standing, or the amount of support given by a pessary with the superincumbent weight of the abdominal viscera pressing upon it; or the persistence of the dislocation found in the recumbent position. Thus a retroversion on the back may be found an anteversion or simple descensus on the feet. I have repeatedly detected the cause of a sensation of weight and pain in the suprapubic region by finding the cervix uteri resting on the pelvic floor, or the fundus pressing against the sym-

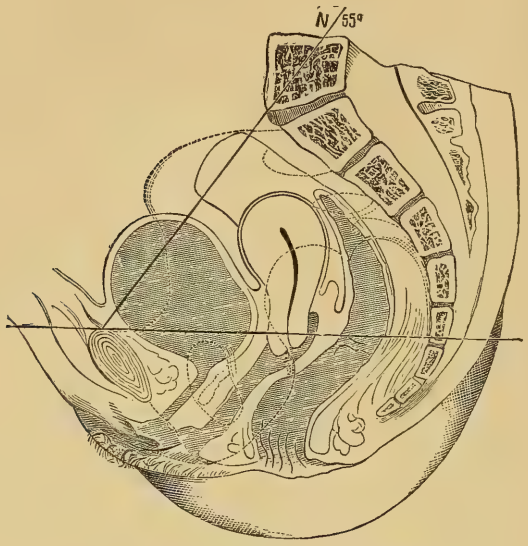


FIG. 7.—Erect Position. (Hegar and Kaltenbach.)

physis, while examining in the erect posture, when previous exploration in the dorsal position had failed to reveal any displacement or other cause for the symptoms complained of. The entire relief afforded by a suitable pessary showed the correctness of the diagnosis, which could not have been made in any but the erect posture. Any imaginary objection on the part of the patient for esthetic reasons is readily overcome when the valuable information to be obtained by this examination in the erect posture is explained to her. I am under the impression that digital examination in this position is by no means so frequently employed as it should be.

4. EXAMINATION COUCHES.

The exigencies of practice require us to see many of our gynecological patients at their homes, and to examine them on any couch which happens to be convenient, generally a sofa, or a bed, and if practicable in the gluteo-dorsal position, with the hips resting on the edge of the bed, the patient lying crosswise, in which case it is well to place a lapboard or some hard board under the patient's pelvis. A very fair examination may be made,

and a correct diagnosis arrived at, in this manner; but whenever the case presents unusual difficulties of diagnosis, or the examination entails the use of the duck-bill speculum, it should be undertaken on a proper level table or high couch, with all the necessary conveniences and assistance. The feebleness of the patient may require this to be done at her home;

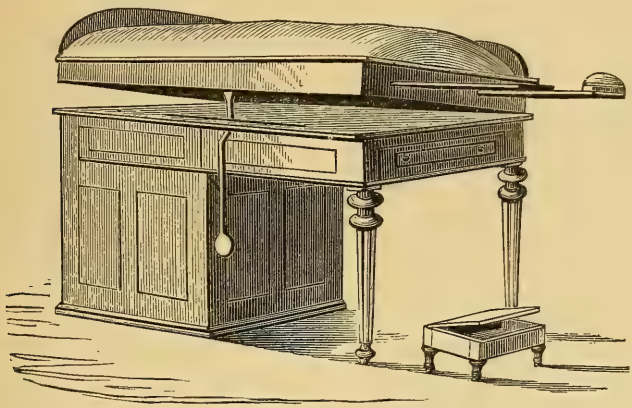


FIG. 8.—Goodell's Examining-table.

but the physician should impress upon those of his patients who are able to walk the advantage to himself as regards convenience, and therefore to themselves as regards freedom from discomfort and pain, of having the examination made at his office. For like reasons all subsequent treatment which does not require rest in bed should also be administered at the office.

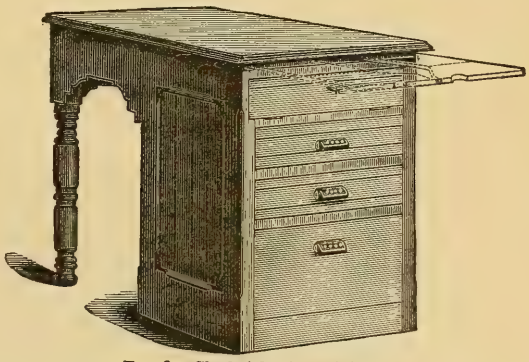


FIG. 9.—Chadwick's Examining table.

The specialist will always examine his office patients on a table prepared for the purpose, while the general practitioner more frequently makes use of an adjustable examining-chair, of which there are various patterns, the best being, in my estimation, those of Archer & Wilson. The disadvantage of these chairs is that, while they are very useful for digital, bimanual, and ordinary specular examinations, their immovable side-arms render them unfit for the use of the duck-bill speculum. The specialist, therefore, in this country at least, is always provided with an office-table, particularly constructed for the use of this speculum, without which modern gynecology can scarcely be efficiently practised. Any ordinary strong level table 4′ by $2\frac{1}{2}$′, and 3′ high, with about 2″ of the legs at the head-end sawed off,

will do for this purpose; indeed, in case of need, the examination can be made on a lounge or bed, when, however, difficulty is generally found in securing good light, and the lowness of the couch is very uncomfortable to the physician. The specialist will find it worth his while to procure the best possible arrangement for his peculiar practice, and this is undoubtedly a firmly upholstered table of the following description: It is 42″ long, 27″ wide, 32″ high at the foot, 29″ at the head, sloping three inches from foot to head. It has a headpiece and sidepiece to prevent the patient from sliding off. The table has a double top, the upper padded one being capable of being raised at the left side of the table, by a lever to a height of 4″, the right border moving on hinges. In this way the abdomen gets, besides the constant downward dip of 3″ built into the table, an optional dip of 4″, whereby the abdominal viscera are still further thrown to the dependent left side of the patient. (This movable top is

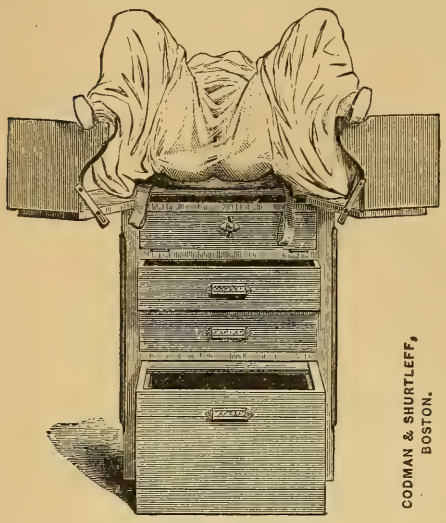


FIG. 10.—Chadwick's Examining-table with Patient in Front View.

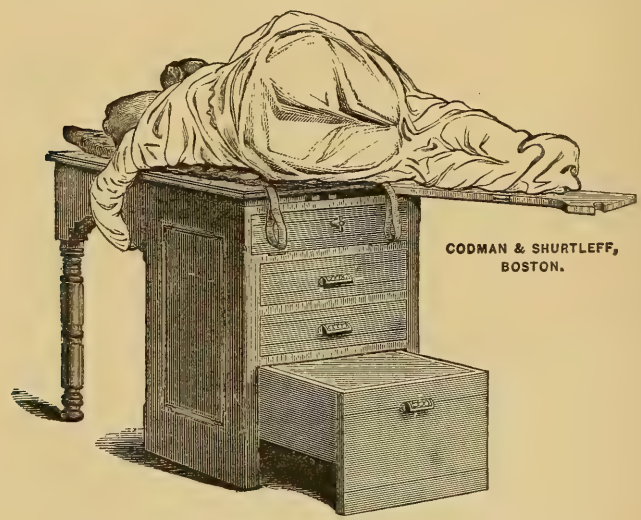


FIG. 11.—Chadwick's Examining-table with Patient in Sims' Position.

not absolutely necessary, and some expense will be saved by omitting it. I have not had occasion to use it for some years.) At the foot-end are two sliding boards, the left one provided with a movable padded block for the

feet to rest upon, and, with the block tipped down, for the left foot in examinations on the back; and the right one for the right foot in the same position. These slides have sockets cut into them for the heels of the patient's shoes. At the foot of the table is a long drawer for instruments and fluid-bottles; at the head-end any desired number of drawers may be attached, arranged to suit the fancy of the owner. The patient mounts on the table by means of a small stepladder or footstool, and the physician sits at the foot-end on a round (piano-) stool. The footstool may contain a basin, or be utilized for cotton, tampons, or waste scraps.

The table which I have here described is one used by Dr. Goodell and modified after one of Dr. M. D. Mann, who had the idea from Dr. T. G. Thomas, who to my knowledge was the first to have a table of this pattern constructed. I myself had one made after Dr. Thomas' pattern, with a slight difference in the arrangement of the drawers, and have used it constantly and with the greatest satisfaction for the past ten years. This table can be made by any ordinary cabinetmaker or carpenter, neatly upholstered in leather, at from thirty to forty dollars. A cheaper and less elaborate table of this pattern is that of Dr. S. W. Francis, of Newport, R. I. To each top are attached two serrated arms, by which the tops can be raised as high as the arms will permit, being prevented from falling by ratchets which catch under the teeth. To lower either, it is necessary only to pull upon the handle, which is attached to a cord connected with an escapement on that side. It is made to order by Caswell, Hazard & Co., of New York. Another very practical and ornamental examining-table is that devised by Dr. James R. Chadwick, of Boston, and sold by Codman & Shurtleff, of that city, for forty-five dollars. The accompanying cuts sufficiently explain its construction. It does not possess the lateral and longitudinal obliquity, the former of which is of inestimable value in enabling the physician to dispense with the services of a nurse to hold the speculum; the lateral pitch tips the viscera so far forward and downward that, on retracting the perineum with the speculum, and admitting air into the vagina, the anterior vaginal wall is so ballooned out as to render a depressor unnecessary; the physician therefore has his right hand free for other work.

The objection has been made against these tables that their appearance is alarming and repulsive to the patient, who hesitates to mount on a table which looks to many of them like what one of my patients delights in calling it, a "rack." Besides, it is objected that they are not as neat-looking as an adjustable chair, and show what they are intended for. As regards the latter objection, it may be answered that the office of a physician is not a lady's boudoir; and as for a lady's refusing to mount the table, I have never found more than a momentary hesitation on being confronted with it behind the screen, with which most gynecologists hide their instruments of torture; and I am quite confident that no woman, however refined or capricious, will care whether it is a table or a chair on which she has to place herself, at the request of her trusted physician, when once she has made up her mind to an examination. Of course, the physician can do

much by his manner (as already stated) to mitigate the unpleasantness of the ordeal.

For operations an ordinary flat table of the size first mentioned, covered by a quilt and sheet, answers every purpose.

5. EXAMINATION WITHOUT INSTRUMENTS.

A. Inspection.

When a gynecological patient presents herself for diagnosis and treatment, it is incumbent on us, after taking her general history and symptoms, to ascertain what information ocular inspection—general and local—of her person will give us.

A glance at her figure will tell us whether she is tall or short, lean or stout, well-built or misshapen. The expression and color of her face will show whether she is in apparently good general health, or whether she is anemic (chlorotic), plethoric, or cachectic; the expression of her eyes, and her manners, may tell us her peculiar temperament. Her tongue and gums will inform us to some extent of the condition of her digestive organs and the quality of her blood. Even through the clothes we can detect any unusual prominence of the abdomen; and it may be useful to note the amount of her mammary development.

On placing the patient in the dorsal position, if there be anything in the symptoms calling for an inspection of the breasts and abdomen, the clothing is loosened about the waist, and the abdomen laid bare, the flexed lower extremities being covered by a sheet, as well as the face, if the patient desires it. The breasts are then exposed, their size and firmness, the color of the areolæ and nipples, presence or absence of the small glandular nodules, known as Montgomery's follicles (the unusual development of which is, unless lactation be performed, strong evidence of pregnancy), noticed. Proceeding to the abdomen, its distention, shape, color; the hue of the linea alba; the prominence of the umbilicus; the presence or absence of irregular pink or white striæ, and of a separation of the recti muscles, are all signs to be observed by the eye. Peculiar motions of the abdominal wall due to the movements of a child in the uterus, or the peristaltic action of the distended intestines, or contractions of the abdominal muscles, or the pulsations of the abdominal aorta, may also be visible if the walls are thin. The presence of the striæ above-mentioned was formerly attributed to laceration of the corium of the skin by its distention; recently Dr. Busey, of Washington, has advanced the view that they are due to the obliteration of lymph-spaces and atrophy of adipose tissue in the corium. They by no means prove the presence or previous existence of pregnancy (for they are wanting in ten per cent.), and merely show the occurrence of a certain amount of distention of the skin from any cause; they are found not only on the skin of the abdomen, but also on that of the breasts, thighs, and gluteal region, in women with strongly developed adipose tissue.

Inspection of the abdomen may further show us, by the peculiar discoloration or cicatrization of certain portions, whether blisters, leeches, tincture of iodine, hot poultices, or cupping, have been employed, and thus give a hint as to previous affections of the patient. The distended urinary bladder may also be visible.

The appearance of the lower limbs, their straightness, the presence of varicose veins, or signs of present or previous disease, is also worth a glance.

While it is necessary to inspect the remainder of the body only when the history renders it desirable to do so, it is always advisable, in my opinion, to subject the external genital organs of every female who comes to us for disease of the sexual system to a careful ocular examination before proceeding to the first internal examination. The practice of a gynecologist is rarely confined to women of the higher classes, and even among them unexpected forms of disease of the external genitals are occasionally found; in the lower classes, the physician has to fear the presence of specific or parasitic contagion (pediculi pubis), which it is his duty to himself to guard against. Irrespective of this precaution, the information obtained by an inspection of the vulva and vaginal orifice is often of the greatest importance.

The examination may be made in the dorsal position, the patient being covered by a sheet, or on the side. I have never found a patient object, provided the mistake was not made to ask her permission. If the inspection is made as a matter of course in a quiet, delicate manner, it is completed almost before the patient is aware of it.

The points to notice are: the situation of the vulva, whether normal or too far back; the color and size of the labia; the condition of the mons veneris (absence of pediculi); the presence of intertrigo of the thighs; the length of the perineum; the presence of hemorrhoids; the co-adaptation of the labia, or gaping of the vulvar orifice; the size of the clitoris; the presence of ulcers or eruptions (follicular, chancroid, or hard chancre, mucous patches, or epithelioma) on the vulva or perineum; the protrusion of a portion of the vaginal wall; the presence of varicose veins, or edema of the labia. On gently separating the labia with the fingers of either hand, the introitus vaginæ is exposed to view, and its color, whether normal, pale pink, or red, eroded, and inflamed; the presence of a prolapse of the anterior or posterior wall of the vagina; the presence, shape, or absence of the hymen; the evidence of coition or parturition (lacerated hymen for coition; effacement of the shreds of the hymen, rupture of the fourchette for parturition); presence and character of the vaginal discharge; swelling of or discharge from the Bartholinian glands; the appearance of the meatus urinarius; presence of caruncles—are all visible. In women whose vulvo-vaginal tissues have become relaxed from imperfect puerperal involution or pluriparity, the vulva frequently gapes so much as to afford a view some distance into the vagina on merely separating the labia with the fingers, and I have even exposed the cervix in this manner. In such cases the mere spreading open of the thighs, in the dorsal position, causes the vulva

to gape. Occasionally inspection will reveal to us a prolapsus uteri or vaginæ, or a hernia of which the patient had made no mention.

The importance of recognizing by a local examination whether a woman is a virgin, a nullipara, or a parous woman was made apparent to me in two cases which came under my notice during the past two years. In one a young woman carrying a ten-months' old child consulted me as to whether she was again pregnant, saying that the child with her was hers and one of twins. On inspecting her vulva I found the hymen torn, but its folds still present, the fourchette intact, and, on touching the cervix, a smooth, circular os. I told her that she was not only not pregnant, but that she had never had a child. She persisted in her story, and I dismissed her. A year later she came again to see whether she was pregnant, and this time I found her so. On inquiring her motive for attempting to deceive me previously, she said that I was quite right, but that she had wished to fasten the paternity of a child on her lover. In the second case, an elderly maiden lady of the highest respectability consulted me for some pelvic ailment. She readily consented to an examination, and I expected unusual difficulty in inserting my finger. What was my surprise, not only not to find a tense hymen or a contracted vaginal orifice, but to feel my finger slip into a vagina as gaping as that of a multipara, and on inspection I found absolutely no vestige of the hymen, the fourchette gone, and the perineum and vulvar aperture presenting every trace of parturition. I have no doubt whatever that this lady had given birth to one or more children, a belief which is confirmed by the stanch fidelity which she has shown me since, in spite of my suggesting to her (as a safeguard against allowing her to suppose that I had overlooked this, for a virgin, peculiar condition) that she had concealed her previous marriage and maternity from me, a suggestion which she, of course, strenuously denied.

Two small tubular glands in the urethra, which open at either side of the meatus, have lately been discovered by Dr. Skene. If inflamed they give rise to a very obstinate urethral discharge, which can be cured only by slitting up the tubules and cauterizing them. In this condition their orifices are to be seen as two minute yellow spots at either side of the meatus.

An inspection of the secretions oozing from the vagina, or removed on the examining finger, is of great importance, and may reveal the nature of the disease. The secretions from the vaginal and the endotrachelean mucous membranes differ essentially in character and appearance ; the vaginal being creamy, thin, or purulent, and of acid odor ; that from the cervix thick, stringy, glairy, or discolored, and inodorous. A creamy vaginal discharge is usually a chronic symptom, and depends on venous hyperemia or general anemia ; yellow, greenish, sanious, offensive discharge leads to the suspicion of an acute hyperemia or venereal infection ; a putrid, shreddy secretion speaks for malignant disease. The expulsion of clots, so often spoken of by patients as a matter of importance in describing the character of their menstrual discharge, means merely the retention of the blood in the vagina until it had time to coagulate, and is a symptom of no

special significance whatever. The physician should always be cautious about diagnosing a venereal infection—a gonorrhea—merely from the character of the discharge. He should remember that his decision implicates another besides his patient, and that he may be called upon to prove the correctness of his view in a court of law.

B. Auscultation and Percussion.

It is manifest that *auscultation* can but rarely be of service to us in gynecological practice. But, as many cases of pregnancy come into the hands of the gynecologist for diagnosis of that condition, it is obvious that abdominal auscultation should never be omitted when there is the least prospect of the patient's being in advanced pregnancy. But there are other conditions in which auscultation may be useful; such as tumors, in which the ear may detect the presence of large arteries by the systolic thrill spreading from, or the murmur occurring in them; or the existence of peritoneal roughness and adhesions by a friction sound; or the presence of an aneurism; or the presence of loose ascitic fluid, by its splashing sound on sudden change of position of the patient. In suppurating ovarian cysts with decomposed contents, the presence of air in the sac may be detected by a succussion sound. The pulsations of the abdominal aorta are readily audible, and may be distinguished from the fetal heart by being synchronous with the radial pulse.

Percussion has a far wider range of utility; indeed, it is indispensable in the diagnosis of abdominal tumors. As for auscultation, the patient should be in the recumbent dorsal position, with thighs flexed, the clothing about the waist loosened and drawn down, and the abdomen bared. By means of percussion, the extent of a tumor may be detected by its area of dulness; or the interposition of intestines between the tumor and abdominal wall, evidently of great importance during ovariotomy, and also valuable as a means of diagnosis between ovarian tumors (in which the uniform dulness shows that the intestines have been pushed to the sides and behind the tumor), and renal or splenic growths (in which intestinal tympanitic sound is usually found at some spot of the anterior abdominal wall). Besides, for tumors of the uterus and ovaries, percussion is useful in locating and defining plastic exudations into the cellular tissue of the broad ligaments, and into the peritoneal cavity. A change in quality of the percussion sound on altering the position of the patient will show the presence of a movable mass or free fluid in the abdominal cavity.

Percussion is applicable directly to the genital organs only in case of vaginal enterocele, labial hernia, or the suspicion of the presence of intestines in a prolapsed uterus and vagina.

Auscultation may be practised either with the stethoscope or directly by placing the ear to the abdomen; percussion may likewise be made with the plessimeter or the fingers. Habit and preference will decide in favor of either. I usually prefer the direct methods.

C. Abdominal Palpation.

Palpation is by far the most important method of examining abdominal tumors, very many of which without it would practically be unrecognizable. It requires a great amount of exercise and practice, and even most competent operators have been misled by their sense of touch in diagnosing abdominal tumors. The differential diagnosis between multilocular ovarian cysts and fibrocysts of the uterus, for instance, is often absolutely impossible, and a pregnant uterus has been taken for either of these tumors, or ascites mistaken for an ovarian cyst by physicians of the highest eminence.

Of course, it is not necessary to palpate every case of genital disease. In such cases in which it appears desirable, the patient should be placed in

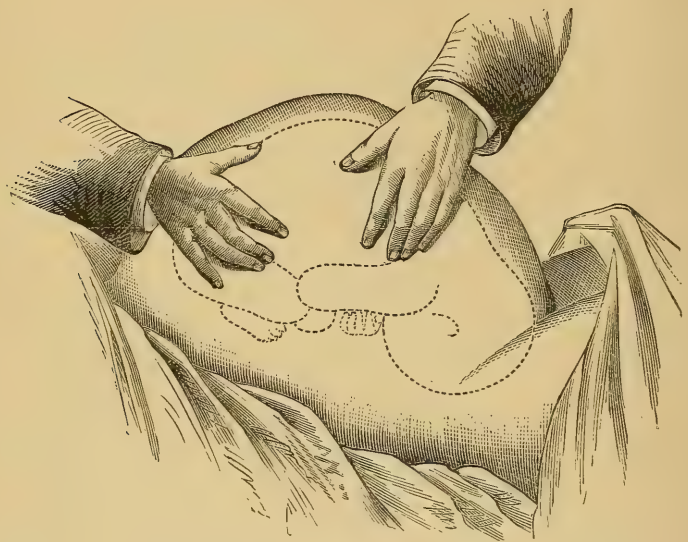


Fig. 12.—Manner of using Hands in Abdominal Palpation. (From Mundé's "Obstetric Palpation.")

the dorsal position, which will produce the greatest possible relaxation of the abdominal walls and the minimum of intra-abominal pressure. Such a position would be that described as the gluteo-dorsal; but as this position is uncomfortable and unpleasant to the patient, it is advisable to try the ordinary flat dorsal position with sharply flexed and but slightly separated thighs first. The clothes should be drawn down to the symphysis, and the abdomen completely bared, as in inspection, auscultation, and percussion, which, indeed, should generally precede palpation. There are other positions in which palpation is practicable, such as the erect, lateral, genu-pectoral, but they are used chiefly to ascertain the mobility or change of position of a tumor, and are attended with the difficulties which the increased abdominal pressure entails in the erect posture, and the weight of the abdominal walls and viscera in the genu-pectoral position. In some

instances the latter proves useful in dislodging a tumor or the uterus from the pelvic brim, and making it accessible to the palpating hand.

The patient being prepared in the ordinary dorsal position with recently evacuated bladder and rectum, the physician steps to her side and places his warmed hands gently on the abdomen, using only the tips of the four fingers for palpation. Proceeding with a pawing motion he explores region after region of the abdomen, preferably following a regular routine in order not to overlook any portion. Thus he may first palpate the supra-umbilical portion, then proceed to the umbilical, hypogastric, and the inguino-ovarian regions. The supra-umbilical portions are palpated with the finger-tips pointing upward, the median parts with the finger-tips pressing backward toward the vertebral column, and the infra-umbilical regions with the tips pointing downward into the pelvic cavity. Thus region after region is explored, and any abnormality carefully mapped out and traced. A great obstacle to palpation is the voluntary resistance of the patient by contraction of her abdominal muscles. This may be overcome by diverting the patient's attention, letting her open her mouth, or take a deep inspiration and make a correspondingly long expiration, during which latter the abdominal viscera and wall follow the receding diaphragm, and the fingers can be rapidly thrust inward. Filling the bladder and rectum with water and rapidly withdrawing it will, according to Hegar and Kaltenbach, produce immediate relaxation of the abdominal walls. In cases of absolute impossibility to secure relaxation, palpation under anesthesia may become necessary, unless the physician would run the risk of making an utterly wrong diagnosis. Tumors of apparently undoubted existence often miraculously disappear under an anesthetic. Thus, I remember a consultation case of supposed extra-uterine fetation with apparently distinct lateral tumor (the uterus being found normal per vaginam) in an excessively hyperesthetic patient, where the tumor had entirely disappeared when the examination was repeated under ether. Patients differ very greatly in their amenability to palpation; in nervous, hysterical women and young girls the practice will generally be found very difficult, often impossible, for frequently they are absolutely incapable of controlling their will.

Another obstacle of scarcely less frequency is adiposity of the abdominal wall. This naturally cannot be overcome. Another, still, is tenderness and inflammation of the abdominal or pelvic viscera, the former of which may often be annulled by gentleness and persuasion. Another is the existence of free fluid in the abdominal cavity, which may require removal before palpation is practicable.

Irrespective of the advantage of gentleness in palpation as regards the avoidance of exciting reflex or voluntary abdominal contractions, or producing pain, it is advisable to use great caution in palpating the abdomen in order to avoid bruising delicate or inflamed structures, tearing adhesions, or rupturing cysts. The latter has repeatedly been done in the case of small ovarian cysts.

In a favorable case with thin, flaccid abdominal walls, the palpating

fingers can readily touch the lumbar vertebræ, the sacral promontory, the abdominal aorta, the pelvic brim, and the fundus uteri. The presence of a tumor or swelling of any kind in the regions named would, therefore, be easily detected. Besides, the inguinal regions, the crural and inguinal canals should be palpated for enlarged glands or hernial sacs. But in the majority of cases the fingers can only enter deeply enough to feel the indistinct resistance offered by the intestines, and can but suspect the fundus uteri by its greater firmness. It is, therefore, not so much for the detection of small intrapelvic growths that palpation is useful, as for the recognition and tracing out of large tumors, arising either from the uterus, ovaries, kidneys, liver, spleen, or other abdominal viscera.

There are several normal conditions which on superficial observation might easily be mistaken for pathological growths. Such are first of all the pregnant uterus; then, the distended urinary bladder; further, the overloaded intestine. So long as the fetus has not attained a palpable size, the existence of pregnancy can be detected by palpation only by the rational signs and the uniform spherical enlargement and elastic feel of the uterus. When once the separate members of the fetus are recognizable by the abdominal touch, the differentiation of pregnancy is evidently easy.

There are, however, cases in which differentiation is exceedingly difficult; and competent observers, even of the highest rank, have repeatedly mistaken a pregnant uterus for an ovarian tumor, or have overlooked the coexistence of both conditions. Only experience and careful attention to the details of examination will guard against such errors.

The distended bladder can scarcely be overlooked if the precaution, always to be taken before proceeding to palpation, of securing voluntary or instrumental micturition immediately beforehand is adhered to. The dull percussion sound, central situation, uniform ovoid outline, and absence of depression between the tumor and the symphysis, should direct attention to the bladder. I once saw a case in which such a central, ovoid, tense tumor, of the size of an adult head, appeared quite suddenly above the pubis, and, the catheter showing the absence of urine in the bladder, the diagnosis remained doubtful, until the discharge of a large quantity of fetid pus per rectum, and disappearance of the tumor, showed it to be one of those rare cases of perityphlitic abscess, in which the pus points downward and toward the median line.

An accumulation of fecal matter in the large intestine if small in amount will escape detection by palpation, unless the abdominal walls are very thin and lax. If the accumulation increases, it may be recognized at first as a soft, pultaceous, displaceable mass of greater or lesser magnitude, later as hard nodules or lumps. If situated in the sigmoid flexure, the mass might be taken for a coil of intestines matted together by peritonitic exudation, particularly if there be tenderness in the left iliac region. Occasionally the coprostasis attains such dimensions as to be mistaken for a semisolid ovarian tumor, as happened in a case in the Julius Hospital in Würzburg during my service at the Maternity there, in another in the practice of Dr. Sears, of New York, and in a third case in the service of

Dr. J. B. Hunter at the New York Woman's Hospital. The free evacuation of the bowels would obviously clear up the case at once, but unfortunately in these cases of coprostasis that is precisely the most difficult thing to obtain.

Tumors situated in the anterior abdominal wall between the sheath of the muscles and the peritoneum are distinguished with the greatest difficulty from intraperitoneal growths. Only by the possibility of making the fingers of each hand meet behind the tumor can its extraperitoneal origin be assured. Plastic exudations in the subperitoneal cellular tissue in either iliac fossa are very easily accessible to palpation and percussion, which would not be the case if the exudation were in the true pelvis. Retroperitoneal tumors may be palpated from the side, or by grasping the whole lumbar region of one side in one or both hands; if the abdominal tumor is movable and simulates a floating kidney, the diagnosis may be affirmed or corrected by feeling for the kidney in its normal position in the manner indicated. Retroperitoneal tumors are only palpable through the anterior abdominal wall, when they have attained considerable size. As a rule, it may be assumed that tumors growing from the pelvis spread upward and remain connected with their place of origin so as to have no interruption in their continuity. *Per contra*, tumors growing downward from the superior abdominal organs (kidney, spleen, liver, stomach) generally leave a sulcus between their lower border and the symphysis pubis, and do not reach down into the true pelvis until they have attained enormous size. Exceptions to this rule may occur in comparatively small pelvic tumors with long thin pedicles, which permit the growths to rise out of the pelvis to the extent of the pedicle, thus leaving a depression above the symphysis; and in supra-abdominal tumors with long pedicles, which allow their descent into the pelvis. In some cases the laxity of the abdominal walls will permit the fingers of both hands to be pressed in so deeply as almost to meet behind the tumor, and clearly feel the relations of its attachment. In one such case (of complete diastasis of the abdominal muscles) the covering was so thin as to show the tortuous vessels of the tumor through the skin; the fingers could distinctly grasp the slender pedicle underneath the tumor and feel it arising from beside the uterus, the fundus of which was also palpable. A diagnosis of cyst of the left ovary was made by myself and other gynecologists, but the operation proved the tumor to be a cyst of the mesentery, and the thin pedicle to have been small intestine. In another case where I had positively diagnosed a multilocular ovarian cyst, and had practised electrolytic puncture, with the result of contracting and solidifying the growth, the consequent separation of the lower border of the tumor from the symphysis induced several of our most prominent gynecologists to pronounce it a renal or splenic tumor, but not ovarian. The operation, performed by one of these gentlemen, showed an almost solid tumor of the ovary of the size of an adult head, attached by a long pedicle to the left broad ligament.

The peculiar feel of the surface and substance of a tumor to the palpating fingers is a valuable aid in diagnosing its nature and contents.

Thus we have a smooth, uniform, elastic contour, with the sensation of a wavy motion imparted by one hand striking the abdomen on one side to the hand on the other side, and we think of a large cyst with fluid contents and moderately thin walls; or, we feel a hard, dense, nodular mass, with here and there large protuberances, and no evidence of fluctuation, and the chances seem in favor of subperitoneal uterine fibroid; or, we feel a doughy, fleshy, irregular surface, which is slightly impressible but scarcely elastic, and we think of a semi-solid ovarian tumor, or a uterine fibrocyst. The degrees of firmness and softness of tumors are so exceedingly variable that it is impossible to define them; besides, the sense of touch differs in different individuals. Only long practice can enable a correct discrimination between the more delicate shades of resistance of different tissues. Between the two extremes of the pulpy softness of a half-filled ovarian cyst (after tapping) and the stony hardness of a calcified fibroid or lithopedion, there are innumerable degrees of consistence.

A sensation of gradual hardening on palpation suggests the presence of contractile muscular fibre (enlarged uterus, as chiefly in pregnancy), and thus affords an aid to diagnosis.

The sensation of fluctuation is probably the most difficult of all to recognize in doubtful cases. When one hand strikes or pushes one side of the abdomen, and the palm of the other hand applied to the other side feels a distinct impulse, like a wave of fluid striking against it, there can be but little doubt of the presence of fluid. So, also, when this wave is felt at a certain distance, and is imperceptible somewhat farther off, can we assume the presence of a partition or septum dividing the cyst into two or more compartments. But to detect the presence of deep-seated fluid in an abdominal tumor, by the sensation of fluctuation, requires a great amount of practice, and has baffled even the most expert. A soft, vascular, succulent myoma may (like a subcutaneous lipoma) convey a precisely similar impulse to that of fluid. Errors may also be committed by mistaking the elasticity of an adipose abdominal wall for fluctuation.

A peculiar boggy, doughy feel of a tumor may suggest deep-seated fluid, but a positive opinion on this point should be guarded.

The existence of fluid having been determined by fluctuation, it is important to ascertain whether this fluid is enclosed in a sac or is loose in the peritoneal cavity. By noting the absence or presence of changes in the seat and area of fluctuation in different positions of the patient, this point may generally be settled. Still, I have seen an eminent European surgeon, assisted by a no less eminent gynecologist, open an abdominal cavity for undoubted ovarian cyst, and find only free ascitic fluid. This case forcibly illustrated the evil of making a careless diagnosis in accordance with a preconceived opinion.

If we rapidly press in the abdominal wall and then as quickly relax the pressure, we may, in certain cases, meet with a sudden momentary resistance, like that of a solid body floating in fluid. This is the ballottement so familiar to obstetricians in connection with the movable head or breech of the fetus in utero. It is chiefly met with in gynecology in cases of

pediculated subperitoneal fibroids of the uterus, which float upon the intestines as in water. Small solid ovarian tumors may give the same sensation. I recently met with a case in my service at Maternity Hospital, in which a pediculated fibroid at the fundus uteri was mistaken by the junior assistant for a ballotting fetal head, and, as one head presented at the os, the case was supposed to be one of twins.

The thickness of the fluid may, to a certain extent, be estimated by the rapidity and distinctness of the wave of fluctuation ; the more rapid the wave, the thinner the fluid. However, the tension of the cyst or abdominal wall may give greater impetus to the wave, and thus deceive the examiner.

A change of position of the patient may, by altering the situation and relations of the tumor, aid in settling the diagnosis. Thus, palpation in the side or knee-breast position may, by displacing the tumor upward and laterally, give access to its, until then, obscure attachments.

Tenderness of the abdominal wall is a great obstacle to palpation, and at the same time a valuable suggestion as to the diagnosis. The touching of a tender spot will lead us to examine that region more carefully, and may result in the discovery of a localized peritonitis or cellulitis, an ovaritis or a hyperesthetic uterus. It may, also, if met with on the surface of a fibroid or ovarian tumor, lead us to suspect more or less acute peritonitis (therefore future adhesions) at that spot.

D. Digital Examination.

The introduction of the finger—generally the index, occasionally also the middle, and rarely the whole hand—into one of the pelvic apertures of the female, vagina, rectum, and (so far as the index or little finger alone are concerned) the bladder, enables us to explore the cavity of the true pelvis, and to touch certain portions of the organs therein contained. If access were denied us to these cavities, as, for instance, in cases of combined atresia vaginæ and rectal stricture, the other means of exploring the pelvic organs already described would manifestly be of very little service. A digital examination of the immovable structures of the pelvic cavity (the vagina, rectum, bladder, cellular tissue) is the best means (excepting only the eye) of exploring these parts ; but so far as the movable pelvic organs (the uterus, ovaries, tubes, and broad ligaments) are concerned, the intrapelvic finger alone can give but limited information. It touches the cervix, perhaps a prolapsed ovary or inflamed broad ligament, but the fundus uteri is accessible to the rectal and vaginal touch only when displaced, and the other organs can be but vaguely suspected. Even the finger in the bladder finds movable, floating bodies before it in the fundus uteri and the ovaries. Therefore, an essential and indispensable part of a thorough digital examination of the pelvic organs is the simultaneous systematic palpation of the abdomen, whereby the movable organs are steadied and crowded down against the internal fingers. Simple digital examination alone, through one or more of the external pelvic out-

lets, is admissible only when there is a counter-indication to palpation (tenderness, or peritoneal inflammation, resistance on the part of the patient, necessity for haste), or when the examination is merely made as a supplement to previous thorough explorations.

An examination may be made simultaneously with different fingers of the same or the other hand through the vagina and rectum, the vagina and bladder, and the rectum and bladder.

In selecting the passage, through which the examination is to be made, two rules should be observed: 1, to choose the canal which leads most directly to the organ to be examined, and through which the latter is most accessible; and 2, to select that passage which will be least repugnant, painful, or dangerous to the patient. Of the three canals, the vagina is obviously the most convenient and the one, through its constant patency, best fitted by nature for the purpose. The examination per rectum is always repugnant to a patient's feelings, certainly not pleasant to the physician (a circumstance not to be considered, however), and generally more or less painful. The exploration of the bladder with the finger requires previous instrumental dilatation of the urethra, and should therefore be considered in the light of an operation to be practised only under anesthesia. Only when the vaginal exploration fails in giving the desired information, should the rectal touch be employed; and not until these two and all other means fail, should the vesical touch be resorted to.

Topographically, the cervix uteri, the recto- and vesico-vaginal septa, the vaginal roof, and the para-uterine cellular tissue are best felt through the vagina; the retro-uterine space, Douglas' pouch, the posterior uterine surface, the sacral excavation and the sacro-ischiatic notches, through the rectum; and the ante-uterine peritoneal excavation and cellular tissue, and anterior surface and fundus of the uterus through the bladder. The aid of simultaneous abdominal palpation will, however, generally enable us to dispense with a vesical examination at least.

When the vagina is closed to the finger, a combined digital examination of the rectum and the bladder may become necessary, and has given valuable diagnostic information in congenital atresia of the vagina and doubtful presence of uterus and ovaries, and important therapeutic results in chronic inversion of the uterus.

As a rule, but one finger should be employed in examining the pelvic passages; occasionally, if the vagina is very long or capacious, the index and middle finger may be introduced; but it is very rarely necessary to insert more than one finger into the rectum, and never but one into the bladder.

a. *Vaginal Touch.*

The vaginal touch may be practised either in the erect, the dorsal, or lateral recumbent, or the knee, breast, or elbow position. Each of these positions may present particular advantages for indagation, but for the large majority of cases the dorsal recumbent is the most convenient.

The introduction of the finger into the vagina naturally presupposes the patency of the orifice of that canal. The most common obstacle to the finger is the hymen, the imperforation of which requires the division of the septum by the knife. As a rule, the normal aperture of the hymen is sufficiently large, and the membrane so elastic as to permit the gentle, gradual introduction of the finger. In case of excessive rigidity, its gradual dilatation by the finger at the risk of rupturing it, or nicking it with the knife, are justifiable measures, if the examination is imperative. Not unfrequently a resistance to the finger may arise from spasmodic contraction of the constrictor muscle of the introitus vaginæ, due either to fear, nervousness, erosion of the orifice, or reflex spasm (vaginismus) ; or large flabby nymphæ, tumors of the labia majora or clitoris, excess of crinial development, may interfere entirely or temporarily with indagation. Or a contraction of the levator ani muscle, or excessive rugosity of the vagina, may arrest the finger after it has passed the introitus.

In cases where the obstacle depends on the voluntary (although unintentional) resistance of the patient, or where it is due to excessive local irritability, and that resistance cannot be overcome by persuasion, an examination under anesthesia is necessary. Occasionally sufficient local anesthesia may be produced by vaginal suppositories containing opium and belladonna, or iodoform, to enable us to dispense with a general anesthetic.

The previous introduction of astringents by means of injections, tampons, or suppositories, may also contract the vagina so much as to interfere with indagation, and should not mislead the examiner as to the nature of the obstacle.

As a rule, a vaginal examination should give no absolute pain. Only in pathological conditions (inflammation, erosion, ulceration, hyperesthesia, chronic pelvic infiltrations) will the gentle touching of the vulvovaginal canal and its surroundings give rise to pain. Not uncommon causes of pain on introducing the finger are caruncles of the urinary meatus, and hyperesthetic remains of the hymen.

The physician should accustom himself to examine with either hand. The patient may be so situated in bed that only one hand is available, or one hand may be temporarily disabled. Besides, certain portions of the pelvis are more readily touched with one index than the other ; thus, the left side of the pelvis and its contents are more easily reached with the left forefinger, the right side of the pelvis and its contents with the right.

If one hand is to have the preference for indagation, it should decidedly be the left, as most men are more dexterous with the right hand in palpation, sounding, and other instrumental manipulations.

The index-finger, in the vast majority of cases, suffices perfectly for indagation. In large, patulous vaginæ, or where it is desired to reach very high, the middle finger may also be introduced, but I think the fancied advantage of higher reach is counterbalanced by the confusion of the tactile sense of the two fingers, and the discomfort to the patient. It is rare that a forefinger is physically too short to enable it alone to make a

thorough vaginal examination ; and I have generally seen such supposed short fingers grow longer in proportion to the increased experience of their possessors. A practised examiner will usually feel all there is to feel with one finger ; the beginner can do no more with two than one. The middle finger alone, which I have seen used by some, is manifestly much less convenient than the index, and only serviceable in the absence of the latter.

If there is a discharge from the vagina, which possibly may originate in the uterus, it is advisable to introduce the speculum, preferably the cylindrical, before making a digital examination, in order not to interfere with the secretion from the cervix. By indagation, and especially sounding, this discharge may be disturbed or removed, and a valuable point for diagnosis thus lost.

Dorsal Position.—The patient is placed flat on her back, in the position indicated, the hips well down to the edge of the couch or table (which should be on a level with the pelvis of the physician), the knees and thighs bent and abducted, the feet flat on the couch at the side of the hips. The hips should be on a level with the head, perhaps even a little higher.

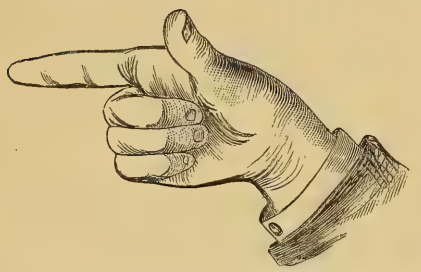


Fig. 13.—Right Hand arranged for Digital Examination.

The rectum has been emptied within several hours, and her bladder immediately before. The face and body of the patient are covered with a thin sheet, which protects her modesty and prevents her from seeing what is being done. The physician washes his hands carefully, removes all impurities from underneath his nails, and searches for any abrasion on his index-fingers, the nails of which should be cut close and smoothly pared and rounded. He then anoints the forefinger to be used with some greasy substance. Both in private and hospital practice vaseline is the neatest article for the purpose, the white preparation being the best. Common soap may also be employed. Any non-irritant fatty substance may be used, such as sweet-oil, glycerine, lard, sweet butter, cold cream ; but, as a rule, the liquid substances are inferior, as they drop from the finger on the clothes or floor, and less effectually protect the finger. These substances may be carbolized or thymolized by the addition of one or two grains of carbolic acid or thymol to the ounce, but this is not necessary. The thymol, however, makes a very pleasant deodorizer.

Before introducing his finger it is advisable for the physician now, if this is the first examination, to inspect the vulva and introitus vaginæ, by lifting the clothes and stepping to one side to admit the light. Having surveyed the vulva by drawing apart the labia majora with finger and thumb of one hand, or the fingers of both hands, he gently separates the nymphæ and exposes to view the meatus urinarius, the vestibule, the

vaginal orifice. Having completed the inspection (the reasons for and advantages of which have already been enumerated under their respective heads), indagation is performed in the following manner:

The physician anoints the index-finger, folds the three last fingers of the same hand as tightly into the palm as possible, abducts the thumb, and standing between the thighs of the patient, slightly toward the thigh corresponding to the examining hand, places the index-finger with the volar surface nearly upward against the perineum, and passes it gently upward until it almost involuntarily slips over the posterior commissure into the cleft of the vulva. The thumb is placed gently against the horizontal ramus of the pubis of the side corresponding in name to the hand used, the first joints of the three fingers are pressed against the yielding perineum. Care should be taken not to give pain by a ring, if one is worn on the examining hand. Indeed, it is a good rule to remove such a ring before proceeding to an examination. As the finger slips through the vulvar cleft into the orifice of the vagina, it notes the condition of the perineum, its integrity or laceration; the patulousness of the vulvar aperture; the rigidity or flabbiness of the tissues; the moisture or dryness, and the sensitiveness of the parts; the situation, anterior or posterior, of the orifice; the height and thickness of the symphysis pubis. The meatus urinarius may also be touched, if there be any vesical symptoms, and its patulousness and tenderness noted; and the finger may even approach the clitoris, if an ocular inspection has not satisfied the physician about these organs. But, as a rule, it is best not to touch the clitoris, especially in nervous excitable women, who may develop erotic symptoms embarrassing to themselves and the medical attendant.

The finger is now passed through the vaginal orifice into the canal of the vagina itself, noting, as it advances, the hymen or myrtiform caruncles; the condition of the vulvo-vaginal glands (whether swollen or not); the presence or absence of protrusion of the anterior or posterior vaginal wall; the moisture, and proceeding upward, the width, length, rugosity, or smoothness of the vaginal canal. The tension of the perineal and levator ani muscles, the distance between the tubera ischii, the rigidity or prominence of the sacro-ischiatic ligaments, and the mobility of the coccyx, are further points to be considered. Commencing immediately under the symphysic arch and extending an inch upward to lose itself gradually in the anterior wall of the vagina is a ridge, often of the thickness of the little finger, the urethra. The relations and sensitiveness of this prominence, especially at the point where it ceases, are of importance. The separation of the rami of the pubic arch may also be valuable information in prospective obstetric cases. To survey all these points is but the work of a moment for a practised finger. To neglect them and rapidly pass the finger to the organ which, in the majority of cases, is probably at fault—the cervix and body of the uterus—would often cause the examiner to overlook important features, and would, in my opinion, constitute a careless and hasty examination. Of course, the order of exploration may be reversed and these parts examined last, if the physician chooses. But I

prefer to proceed systematically in the physical as well as the oral examination.

About two-thirds of the way up the vagina, between two and three inches from the orifice, the finger meets with a more or less conical projection, the cervix uteri, in the centre of which is an opening, the external os. The finger should be swept over the cervix and note its consistency and shape; the size of the os, the condition of its lips or edge, whether smooth, regular, fissured, hard or soft; the presence of a rent in one or both lips; the existence of small nodules over its surface (the ovula Nabothi), the rolling out or eversion of the cervical mucous membrane. The direction in which the os points should further be observed, whether downward, backward, upward, forward, or lateral; also the mobility of the cervix. Having examined this part thoroughly, the finger sweeps around it and touches, one after the other, the anterior, posterior, and lateral pouches of the roof of the vagina. First, the point of reflexion of the vagina on the cervix is noted, whereby the length of the intravaginal portion of the cervix is ascertained. It will be observed that the vaginal reflection posteriorly is at least one-half an inch higher than anteriorly.

The finger is then passed before the cervix and pushed upward with a view to feeling for a firm body, the fundus uteri, which will be found there, if the uterus is antedisplaced; in that case the finger seeks for an angle between the cervix and the fundus at about the vaginal insertion, and by its presence diagnoses an anteflexion, by its absence an anteversion. The tenderness and mobility of the fundus are also tested. Passing behind the cervix, the finger searches for the like firm body which it vainly sought for in front, and if found, seeks the same angle. The degree of the angle should be noted, and, in either case, the ease with which the finger reaches the anterior or posterior body remembered as indicating the degree of displacement. The sensitiveness and mobility of the posterior body are of greater importance than the anterior, owing to the frequency of adhesions between the fundus uteri and the retro-uterine peritoneal pouch and of tumors in that locality. The posterior vaginal pouch is further to be examined for small movable masses, which may be either prolapsed ovaries, or scybala in the rectum, or pediculated retro-uterine fibroids. Whenever a tumor is felt adjacent to the uterus, the finger should endeavor to ascertain whether and to what extent it is connected with the

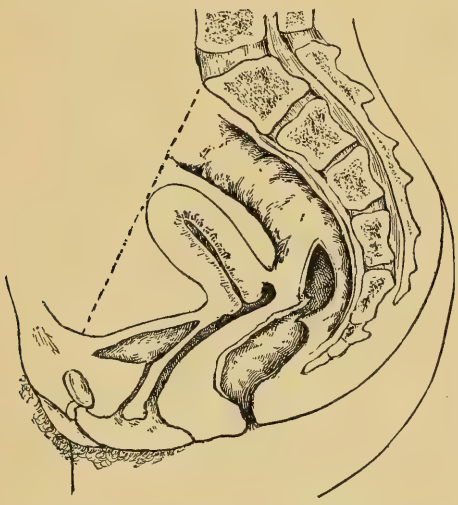


FIG. 14.—Normal Relations of Internal Sexual Organs (P. F. M.).

uterus. Further, the parametrium should be carefully examined for irregularities, nodosities, and tender spots, which are very common, and evidences of more or less acute or chronic cellulitis, or of angio-leucitis. The elasticity, impressibility, and depth of the vaginal roof are also a highly valuable criterion as to the presence or absence of pelvic peritonitis or its residues. But it should be remembered that a shallow vaginal pouch may be congenital, or the result of imperfect development. The differentiation between this condition and a vaginal roof depressed by superincumbent plastic exudation is easily made by means of the normal mobility of the uterus and elasticity of the vagina in the congenital variety. A soft, ropelike swelling, extending from the middle of the posterior wall of the vagina up toward the left along the sacral excavation, should not be mistaken for a neoplasm; it is the rectum, and can be detected by its moderate mobility in the upper portion, by its want of tenderness and the frequent presence in it of a soft pultaceous mass, or hard, movable scybala. The normally situated, not enlarged ovaries and tubes can seldom be felt by the vaginal touch alone, since the great mobility of the normal ovary enables it to evade the intravaginal finger and prevents the latter from receiving more than a mere suspicion of its presence. As a rule, the normal ovary can be clearly felt in women with average adipose development only by bimanual palpation, and then only by practised hands. If the ovary is prolapsed, one intravaginal finger can readily detect it by pressing it against the posterior pelvic wall, when the peculiar olive shape, velvety feel, mobility, and the characteristic acute pain on sharp pressure, will at once reveal the nature of the body. While the normal, not enlarged ovary is not as exquisitely tender on pressure as the healthy testicle, my experience certainly does not agree with that of those observers who claim that it is utterly unsensitive or but slightly tender. I have almost always found it very tender if the pressure was at all severe, and the peculiar pain thus produced, as it were, characteristic and entirely different from that caused by pressure on the other pelvic organs.

Before withdrawing the finger the mobility of the cervix is tested, and care taken to observe whether the cervix returns to its original, or remains in some other position.

It should be remembered that by depressing the elbow and gently but steadily pushing up the perineum with the three folded fingers, the depth of penetration may be increased by at least an inch. If the patient's pelvis is raised by herself or on a cushion, the posterior portion of the pelvic cavity is still more approximated to the examining finger, and the sacral promontory may even be reached if the antero-posterior diameter of the brim is the least shortened, a point of decided importance if the patient should prove to be pregnant. On withdrawing the fingers, the color, odor, and character of the secretion covering it should be noted, as already mentioned under Inspection.

Dr. Eugene C. Gehrung, of Denver, describes an improved method of vaginal touch, to be used when the ordinary touch fails, which consists of introducing two fingers and exaggerating the already existing position

with one finger, while the other explores the anterior or posterior vaginal fornix, as the case may be. By thus pushing the cervix backward in an antedisplacement the anterior surface of the uterus is approximated to the finger against the anterior vaginal wall; in retrodisplacement, the cervix is elevated toward the symphysis, and the other finger more readily reaches the posterior uterine wall in the posterior cul-de-sac. The ovaries, broad ligaments, and Fallopian tubes are also brought nearer to the finger by this method.

Starting from without inward, certain peculiar features in the different sections of the accessible genital tract may be met with, and will denote corresponding physical conditions. Thus, at the *vulva*, enlarged pendulous, highly pigmented nymphæ may lead to a suspicion of onanism if found in young girls, of excessive sexual indulgence or frequent parturition in married women; a highly sensitive, perhaps enlarged, or excoriated clitoris indicates a nervous, erotic temperament, or onanism; erosions on the labia majora, pruritus vulvæ, or the presence of parasites, or, if flat and elevated, either specific patches or folliculitis, the diagnosis between which is not always easy; a laceration of the fourchette or perineum, or obliteration of the caruncles of the hymen, speak for preceding parturition; a gaping, patulous vulvo-vaginal orifice for pluriparity. An intact hymen with sharp, unbroken, spherical or crescentic border generally proves virginity; still, this test is not absolute, since, on the one hand, the membrane may be so elastic as to permit the introduction of the penis without rupturing, and, on the other, it may have been torn or destroyed by treatment or disease. Ordinarily, a hymen torn in one or several places down to its attachment, but capable of being restored to its normal shape by the coaptation of its folds, denotes defloration without parturition. An imperforate and bulging vaginal orifice would speak for retention of menstrual fluid.

A patulous enlarged urinary meatus may be due to artificial dilatation for diagnostic purposes, or if the dilatation be excessive, it may arise from the habitual use of that canal for the sexual act. Small bright red bodies projecting from the meatus (hyperplastic papillæ, caruncles) generally indicate painful and frequent micturition. A red, eroded, tender vaginal orifice leads to the suspicion of onanism or excessive sexual indulgence, or an irritating vaginal discharge.

Passing into the *vagina*, a protrusion of the anterior or posterior wall of that canal shows previous parturition with subsequent subinvolution of the distended vagina; a rough, nutmeg-grater-like feel of the vaginal surface shows the presence of a hyperemia or hyperplasia of the vaginal papillæ, or granular vaginitis; a very moist slippery condition of the passage speaks for hypersecretion, perhaps also from the cervical canal. Adhesions between cervix and vagina and cicatricial contraction of the *vagina* are evidences of adhesive vaginitis, either of puerperal origin, or in consequence of acute specific infection, or of the application of strong acid and caustics. Tense bands, running backward or laterally from the cervix beneath the vaginal wall are signs of old parametran cellulitis.

A long, conical pointed *cervix*, or a cervix curled up anteriorly with the os pointing upward, or a minute, "pinhole" os, are generally signs of congenital sterility; a cicatricially contracted, rigid os of acquired sterility (caustics). A small, round, or transverse os, with smooth lips, denotes nulliparity; a gaping, fissured os, with irregular, notched lips, often admitting the point of the finger, pluriparity. A patulous external os is, however, met with also in nulliparæ, during chronic endotrachelitis, and after the use of cervical dilators (tents) and recent abortion. The excessive moisture and softness of the part will then be noticeable. On the other hand, a small, transverse os may occasionally be met with in women who bore one or more children many years previously, without the orifice sustaining injury at the labor. An excessive softness, pulpiness of the whole cervix may be due to pregnancy, as indeed, may a hypersecretion and puffiness of the vagina and labia; but in a nullipara an unusually soft velvety cervix frequently indicates a catarrhal or follicular erosion of that part, which supposition is confirmed by a sanious glairy discharge removed by the examining finger.

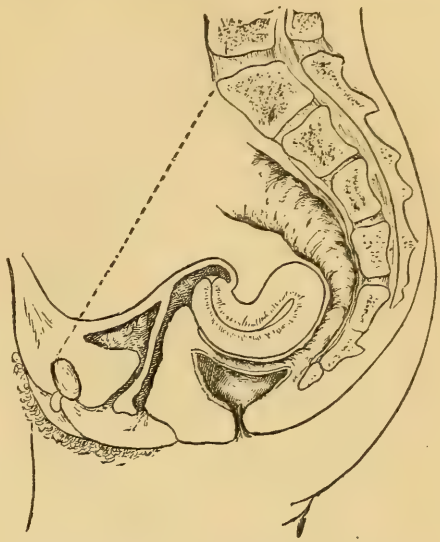


FIG. 15.—Retroversion of Anteflexed Uterus (P. F. M.).

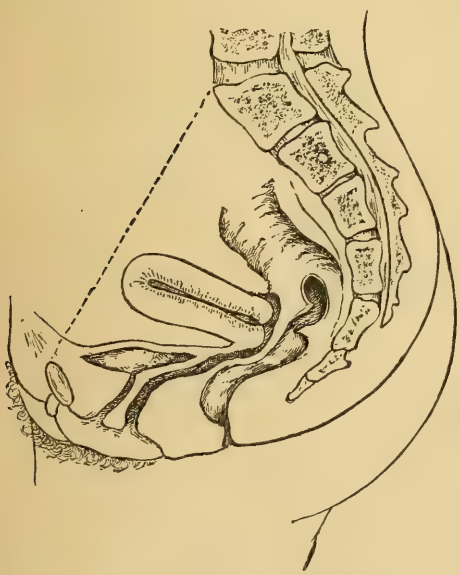


FIG. 16.—Anteversion of Uterus (P. F. M.).

A fissure of the cervix, either unilateral or bilateral, of greater or lesser depth, merely indicates that the patient was delivered of a child, near or at term, but by no means necessarily implies that the labor was instrumental, or that the medical attendant was to blame for the laceration. The lips of the fissured cervix may be almost in apposition, or they may be rolled out "like the cut tops of a celery-stalk" (Goodell), with everted and eroded cervical mucous membrane. Recently I examined a young girl of sixteen years, an undoubted virgin, who was sent

to me by Dr. E. C. Seguin for an opinion as to whether her epileptic fits depended on uterine disease, and to my surprise found an apparent double laceration of the cervix with eversion. A specular examination showed a catarrhal erosion of the everted cervical lips. Unquestionably this was a congenital malformation. Fischel, of Prague, observed a double congenital fissure with eversion of the cervix, in a new-born child. The bare possibility of falsely imputing parity to a woman on the strength of this lesion should, therefore, be borne in mind.

Fig. 17.—Anteflexion of Uterus (P. F. M.).

The surface of the cervix may be smooth, or it may be irregular, nodular, as though lentils or small peas were distributed under its covering; the latter condition is due to the presence of small retention cysts, the occluded muciparous follicles (or ovula Nabothi of the old anatomists) from which the peculiar glairy mucus of the cervix is derived. Occasionally this nodular condition, particularly if associated with simple papillary hyperplasia, may become so excessive as to simulate epithelioma. Scarification of the nodules (if follicles, a glairy fluid exudes and they collapse) and the microscope, soon settle the diagnosis.

A hard, almost cartilaginous, enlarged cervix may be merely the product of hyperplasia, or of caustics applied to a lacerated and everted mucous membrane, or it may be the first stage of scirrhous disease. The microscope will decide. A puffy, moderately hard, nodular cervix, enlarged to twice its size or more, with the enlargement generally extending above the vaginal reflection, means the first stage of parenchymatous cancer; a soft, readily bleeding, cauliflower-like growth of large size is an epithelioma; a

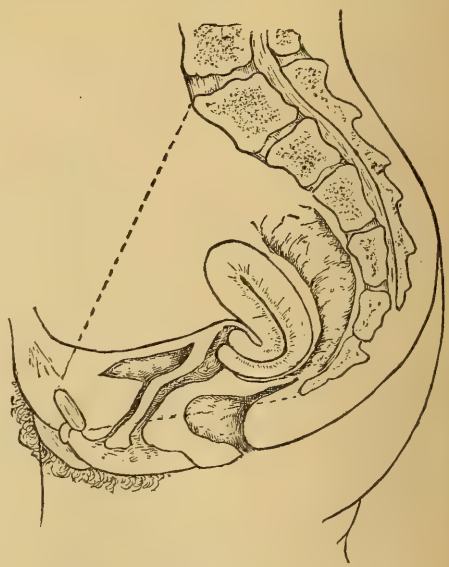


Fig. 18.—Anteflexion of Cervix (P. F. M.).

crater-shaped excavation of the immovable cervix permitting the finger to enter almost to the os internum, with irregular edges and nodular swellings imbedded in the vaginal wall, is the second or ulcerative stage of carcinoma: all these, when once felt, can scarcely be mistaken.

If the cervix and os point backward toward the sacral excavation it is probable that the fundus is to be found in the opposite direction; if the cervix is felt under the symphysis the finger will find the fundus in the posterior cul-de-sac. There is an exception to this last rule, and that is when the whole uterus is pushed forward and upward by a retro-uterine tumor; the uterus is then generally straight, and the fundus inaccessible to the vaginal touch. In flexions of the uterus, the cervix often retains almost the normal position, with the os pointing downward, slightly forward or backward; the finger detects the angle at the anterior or posterior vaginal insertion, which settles the diagnosis between flexion and version.

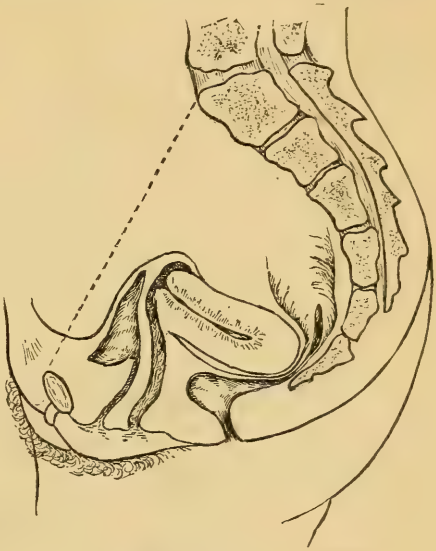


FIG. 19.—Retroversion of Uterus (P. F. M.).

A deviation of the cervix toward one or the other wall of the pelvis generally means a corresponding deviation of the fundus toward the other side, a right or left latero-version. Such latero-versions usually depend on contracting adhesions in the broad ligament, which draw either the cervix (generally) or the fundus toward the affected side. Occasionally the fundus is found on the same side as the cervix, and the uterus is either straight or latero-flexed; this condition is usually congenital.

Passing the finger into the *vaginal fornix*, the solid body usually felt in front of the cervix is the fundus uteri. Tumors are rare in this locality; seldom an enlarged and anteprolapsed ovary, more commonly a uterine fibroid, an ante-uterine hematocele or cellulitic exudation. The bladder is ordinarily not recognizable to the finger; only when it is distended or hypertrophied (as in cystitis) does it impart an elastic resistance to the finger. In two instances I have detected a hypertrophied ureter through the anterior vaginal wall, in both cases the left. At the autopsy of one of the cases the left ureter was found enormously enlarged by hypertrophy of its walls, due to the irritation of pus passing through it from a pyelitis of the left kidney.

In the posterior fornix the finger meets with various tumors of different nature and origin, which often require the utmost ingenuity to decipher. The most common of all is the retroverted or retroflexed uterine

body, next a subperitoneal uterine fibroid, a small ovarian tumor, a cellulitic or peritonitic exudation tumor, a hematocele, most rare a pelvic ecchinococcus tumor, sacral carcinoma, or exostosis. The differential diagnosis between these various growths is often exceedingly difficult to the vaginal touch, especially when a diffuse pelvic peritonitis has fixed an ordinarily movable tumor. As a rule, the fundus uteri is oblong, soft, elastic, tender; a fibroid hard and elastic, perhaps nodular; an ovarian tumor, also soft, elastic, more spherical, and slightly tender; a cellulitic exudation or hematocele, when recent, soft, doughy, impressible, very tender; when older, board-hard, dense, scarcely sensitive. The fundus, fibroid, and ovarian tumor are movable, together with the uterus, unless they be adherent. A pelvic exudation tumor or hematocele is absolutely immovable. If the retrocervical tumor is movable, the finger may gradually push it up and its relations become entirely altered. Thus, recently, a retro-uterine tumor, which first appeared like a retroflexed fundus, but was readily discovered not to be such when the fundus was felt anteriorly by palpation, was diagnosed as a subperitoneal fibroid, until it was pushed up by repeated touching, and finally showed its origin in the left broad ligament, namely, an ovarian tumor.

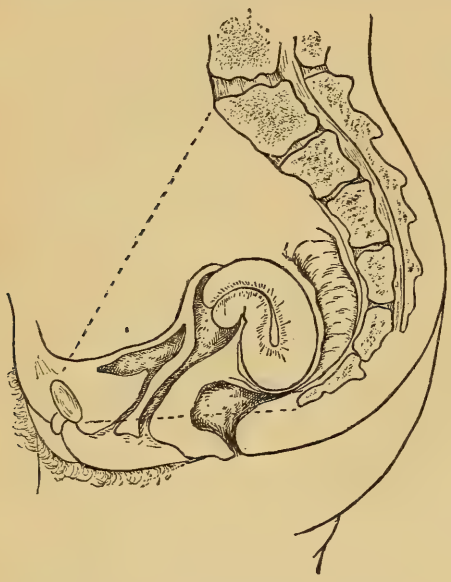


FIG. 20.—Retroflexion of Uterus (P. F. M.).

Another mass frequently felt behind the uterus is the loaded rectum, with its pultaceous or scybalous contents, which are recognized by the impressibility of the tumor and the number of the scybala.

A retro-uterine tumor, for which I have repeatedly seen beginners take scybala, is the prolapsed, and slightly enlarged, ovary. A flat, movable, tender body, of the size of an almond or small fig, is felt directly behind the cervix, often at the very bottom of Douglas' pouch, on a level with the external os, or two such bodies may be found slightly to each side of the median line. If these bodies are flat and but little enlarged, they are tender only on severe pressure; but if enlarged, they are generally exquisitely tender. These bodies can be taken for nothing but the ovaries; they are often so movable as to require two fingers to catch and hold them.

In each lateral pouch the finger in normal cases feels merely a soft elastic resistance. A very frequent sensation in that region is a moderately firm, smooth, often convex tumor, which is more or less tender, and at times has a doughy, boggy feel, giving evidence of deep-seated suppu-

ration. Or the tumor may be hard, or freely fluctuating. This is a cellulitis between the layers of the broad ligament and latero-uterine connective tissue. If the tumor feels shrunken, hard, and is devoid of tenderness, it is not of recent origin. Irregular, flat, more or less tender nodules are often felt in different parts of the retro-lateral pelvic connective tissue, which are the residue of, often unsuspected, cellulitis in former years, or are enlarged lymphatic glands.

Lateral and Latero-abdominal Position.—The physician, standing slightly behind the patient, introduces the index-finger of the hand opposite to the side on which the patient is lying (left side, right hand; right side, left hand) into the vagina with the palmar surface directed backward. The finger may be slipped over the fourchette, as in the dorsal position, or backward from the clitoris, and its introduction will be facilitated by lifting the superior buttock, and thus separating the labia, with the other hand. If the orifice be sufficiently large, two fingers may be introduced in this position, and will, I have found, be much more serviceable now than in the dorsal position, since they enable the examiner to explore also the lower half of the pelvic cavity, and to reach farther up by retracting the perineum. The chief advantage of indagation in this position is the possibility of touching the upper portion of the pelvic cavity (that corresponding in name to the examining hand), and the sacral excavation more readily than in the dorsal position. Thus prolapsed ovaries and posterior and lateral plastic exudations are often more easily felt in the lateral position.

The semiprone position offers no advantages over the lateral for indagation; on the contrary, the uterus and its movable adnexa are removed from the finger by gravitation in the former position. This very fact may, however, occasionally be useful by showing the mobility of the normal organs or of intrapelvic tumors, and thus aid in settling a diagnosis. Anomalies of the coccyx and sacrum are also more easily diagnosed in the lateral decubitus. The majority of gynecologists use the hand opposed in name to the lateral decubitus, as above described; and it requires but a trial to convince any one that anatomically this is the most convenient and useful hand for the purpose. Still, so prominent a gynecologist as Barnes recommends using the *left* index-finger in the *left* lateral position. To me this practice is extremely awkward and inconvenient, for I can only feel the lower half of the pelvic cavity with the sensitive volar surface of the finger, and am compelled to turn and twist my hand, in the most uncomfortable fashion, to reach the posterior and upper portions of the cavity. To recommend the left lateral position and the left hand for ordinary vaginal examination seems to me merely laying unnecessary difficulties in the way of the student without the least compensating advantage.

The knee-chest or elbow position is not convenient for a digital examination, as the gravitation of the viscera away from the pelvis elongates the vagina so much as to render the cervix and vaginal vault less accessible to the finger than in the dorsal position. Only when it is desirable to ascertain the mobility or attachment of certain intrapelvic tumors will secondary knee-breast indagation occasionally prove serviceable.

Erect Position.—The physician kneels on one knee, that corresponding to the examining hand being preferable, or sits on a chair with his body bent forward; the patient stands before him, with separated thighs and slightly inclined body, steadying herself with one hand on the shoulder of the physician or the back of his chair, or he may support her by grasping her corresponding hip with his free hand; or she needs no support whatever. Introducing his hand under the clothes, which the patient herself may hold, he easily passes his forefinger into the, in this position, generally gaping, vulvo-vaginal orifice, or, the usual rule of slipping forward from the perineum may be observed; and then, the relations between the hand and vulva being the same as in the dorsal position, seeks the cervix, which will generally be found lower in this posture. The influence of the erect position and the thereby increased intra-abdominal pressure on the movable pelvic organs has been explained in the description of that position, and it is, therefore, evident that the cervix, vaginal roof, and ovaries in the normal state, and still more in relaxed conditions, and movable tumors of these organs, are then more accessible to the finger. It is, therefore, advisable always to examine patients, in whom a downward displacement of the uterus or vagina is suspected, in this position and thus ascertain the extreme existing displacement. After the adjustment of pessaries for any form of uterine or vaginal displacement the amount of support afforded by the instrument can best be ascertained by examining the patient in the erect posture, and directing her to increase the intra-abdominal pressure by straining. In case of haste, or when it is merely desired to ascertain whether a pessary introduced some time before is still in place and doing well, this posture may further be employed as less laborious and lengthy for physician and patient. The tension of the vaginal roof in this position will, as a rule, prevent the finger from pushing up that septum, as can be done in the dorsal position. Displacements, both anterior and posterior, and also flexions, of the uterus, are aggravated by the erect posture, although in a less measure than the various degrees of prolapsus.

b. *Rectal Touch.*

A digital examination per rectum may be required when an obstruction exists to the introduction of the finger into the vagina (imperforate hymen, atresia, or stenosis vaginæ, vulvar and vaginal tumors), or when it is desired to control the results of a vaginal exploration, or when the patient complains of pain during defecation or of any symptom referable to the rectum. Attention should in every case be paid to the rectum, in order that concealed disease of that organ may not be overlooked, but generally a visual examination will suffice, unless special reasons call for more. The special advantage of a rectal examination is the greater accessibility of the retro-uterine organs and the posterior wall of the uterus. This advantage is particularly available in ascertaining the extent and attachment of retro-uterine tumors and cellulo-peritonitic exudations.

Emmet examines every patient, who consults him the first time, through the rectum, and claims that he can touch the broad ligaments and all the retrolateral uterine tissues so well in this manner that he often discovers small cellulo-peritonitic exudations, adhesions, and contractions, of which the history and symptoms give no idea, but which accounted for many displacements, distortions, and obscure complaints, the cause of which would otherwise have been a mystery, and the treatment correspondingly vague.

Before examining the rectum, several precautions should be employed: 1. The bowel should be thoroughly evacuated and cleansed by means of injections shortly previous to the examination. 2. The space under the nail of the examining finger should be filled with soap, to prevent the introduction of fecal or other matter under the nail. 3. If the finger is withdrawn from the vagina to be immediately inserted into the rectum, it should be cleansed and freshly anointed, in order to avoid contamination of the delicate mucous membrane of the rectum by the vaginal secretion.

These precautions having been observed, the finger, well anointed, is gently introduced into the rectum. The resistance of the external sphincter is usually overcome without difficulty or pain. As a rule, it is not advisable to tell the patient what is about to be done (the directions for cleansing the rectum should be given before every appointed vaginal exploration), but anticipate any objection she may make by at once introducing the finger into the rectum. As the finger passes the sphincter, notice should be taken of pain experienced or hemorrhoidal tumors felt, which may require subsequent inspection. The first object the finger meets is a thick, conical body projecting into the anterior wall, the cervix uteri, which through the rectum appears nearer and is more easily reached, and gives the impression of being larger than per vaginam. Passing up behind the cervix the finger examines the posterior wall of the uterus, and the intervening pouch of Douglas; thence proceeds to touch the posterior wall of the rectum, and the surface of the sacral excavation. Strictures, polypi, cancerous degeneration of the rectum, and affections of the retro-uterine pelvic tissues are thus easily recognized. Great assistance is afforded this examination, by seizing the cervix per vaginam with a vulsella, drawing it down as far as practicable, and at the same time exploring the posterior uterine surface with the finger in the rectum. This maneuvre is particularly valuable in deciding the attachment of retro-uterine tumors.

As a rule, one finger suffices for a rectal examination. The introduction of two will usually give pain and probably be of no particular service.

The *recto-vaginal touch* is a combination of the two methods. It consists in introducing the index-finger into the vagina and the thumb of the same hand into the rectum; or the thumb into the vagina and the index into the rectum; or the index into the vagina and the middle finger into the rectum. Between the two fingers the recto-vaginal septum and the bottom of Douglas' pouch can be thoroughly touched, the finger in the vagina controlling the observations of the one in the rectum, and *vice*

versâ. The utility of this method is evidently limited by the length and mobility of the fingers.

Should the sphincter be so irritable as to deny admittance to the finger, the examination may have to be made under anesthesia, and perhaps the sphincter forcibly dilated. This is always the case when Simon's method, the *introduction of the whole hand into the rectum*, is to be employed. This method was first demonstrated and elaborated by the late Prof. Simon, of Heidelberg, and consists in gradually passing finger after finger through the sphincter, until the whole hand is introduced; the hand is then carried up gently through the wide rectal pouch, to the narrower entrance of the sigmoid flexure, through which the points of the fingers project. The movable intestine can now be carried upward without thrusting the hand through the narrow part of the gut, and the lower portion of the abdominal cavity readily palpated. I myself have felt the kidneys, and reached to the umbilicus in this manner. There is, generally, if the hand be of moderate size (not larger than twenty centimetres in circumference at the knuckles), no injury done to the sphincter other than a few nicks, and incontinentia alvi seldom lasts more than a few days. The utility of this method in settling the differential diagnosis between abdominal tumors, and particularly the nature of their attachments and the presence of adhesions, is obvious. Unfortunately, the dangers of the hyperdistention of the upper portion of the intestine to a great extent counterbalance its advantages. Several cases of rupture of the peritoneal covering of the sigmoid flexure, followed by peritonitis and death, have occurred in both sexes, and I believe the profession are now unanimous in relegating this original but heroic method to instances in which the risk is justified by the exigencies of the case.

The *counter-indications* to the examination of the rectum by one or two fingers exist mainly in objections on the part of the patient, in the presence of fissures, ulcers, or hemorrhoids, rendering this maneuvre painful or difficult, and in strictures, rendering it impracticable. The presence of mucous patches or venereal warts at the anus may present obstacles in the interest of the physician, as also the distention of the rectum by feces. More serious and effectual objections are offered to the introduction of the *whole hand* by an unusually narrow sphincter or intestine, by more or less recent peritonitic adhesions, and by debility of the patient. All these objections may gradually be overcome by proper remedial means.

Recto-abdominal palpation will be discussed later on.

c. *Vesical Touch.*

The introduction of the finger into the bladder necessitates the previous dilatation of the urethra, and is therefore a method of examination not to be undertaken hastily or without due deliberation, and justifiable only when the ordinary means are insufficient for a diagnosis. The dilatation of the urethra should be looked upon as an operation, and should ordinarily be performed only under anesthesia, to be followed immediately by the in-

troduction of the finger. The details of the operation will be described hereafter.

The vesical touch for the diagnosis of utero-pelvic disease has recently been elaborated and extensively practised by Dr. Emil Noeggerath, of New York. It is chiefly useful in cases where it is desirable to feel the anterior surface of the uterus, the broad ligaments, and the utero-vesical pouch of the peritoneum, as in ante-uterine fibroids, small ovarian tumors, and ovarian hernia. As in the rectal touch, the uterus, ovaries, and broad ligaments are rendered more accessible by drawing them down by a vulsella fastened into the cervix. The vesical touch may be required only to ascertain the condition of the mucous membrane of the bladder, and the presence of foreign bodies in that viscus.

If it is desired to touch the urethra only to and through its entrance into the bladder, the little finger will suffice, and the urethra need be dilated only to that width; but if the interior of the bladder or the adjacent organs are to be touched, the whole index-finger must be introduced. Whether index or little finger, the other fingers are best disposed of by being flexed in the palm, and pressed as far as possible into the vulvar cleft. The examining finger then has its palmar surface downward, and is thus best able to feel the parts before it; of course, it is rotated as occasion demands. Or the middle finger may be passed into the vagina. The patient occupies the dorsal or gluteo-dorsal position. If the instrumental dilatation has been thorough the finger will readily slip into the bladder; but if it has been incomplete, the finger will gently conclude the dilatation, and this is generally the way in which this examination is performed. The chief obstruction met with by the finger is at the ring of the meatus, and, this overcome, at the (so-called) sphincter of the bladder. Either hand may be used as most convenient. The lining membrane of the bladder, in the normal condition, has a soft, velvety feel. Simon has felt the mouths of the ureters and passed a sound into them; only the most practised touch will succeed in this maneuvre.

The *vesico-abdominal* examination will be described hereafter.

The counter-indications to the vesical touch are such as would render the preliminary dilatation of the urethra dangerous, or productive of lasting injury—such as recent para- or perimetric inflammation, or excessive fragility or rigidity of the urethral tissues, whereby serious laceration or permanent incontinence might be induced. The urethra once dilated, there can be no objection to the gentle introduction of the finger.

The *vesico-rectal touch* consists in the simultaneous introduction of the index-finger of each hand into the bladder and rectum respectively. It is chiefly of use in diagnosing inversion of the uterus, in which condition the doubtful region of the cervix uteri can be thoroughly examined by the two fingers thus employed. This manipulation may also be of great utility in effecting reduction of the inversion, the two thumbs in the vagina pressing up the fundus, while the indices in bladder and rectum dilate the cervical ring.

E. Bimanual Examination.

By conjoined or bimanual examination or palpation is meant the simultaneous palpation of the abdomen with one hand, while the other is exploring one of the three female pelvic canals. We thus have vagino-abdominal, recto-abdominal, and vesico-abdominal bimanual examination, accordingly as the finger is introduced into one or the other of these cavities.

The simultaneous use of the external hand in depressing or steadying the movable abdomino-pelvic organs, or moving them about, or palpating their surfaces, or feeling any motion imparted to them by the internal examining finger, is of incalculable benefit in determining the shape and position of these organs, or the presence of pathological formations in that locality. Without bimanual examination but a very imperfect conception of the pelvic contents can be obtained, and the *indications* for its employment are therefore embodied in the brief and comprehensive sentence: *Wherever indagation is to be performed, there also is simultaneous abdominal palpation called for.* The physician should accustom himself never to introduce his finger into the vagina, rectum, or bladder without at the same moment placing the other hand on the abdomen of the patient, prepared to exercise whatever manipulation the case may demand. The patient should therefore always occupy, whenever practicable, a position favorable for the relaxation of the abdominal muscles and the diminution of intra-abdominal pressure, as well as convenient for palpation, *i.e.*, the dorsal position.

The *counter-indications* are the same—spasmodic contractions, inflammation, hyperesthesia of the abdominal walls—as those interfering with simple palpation.

As the manipulation is essentially the same, whether the internal finger be in the vagina, the rectum, or the bladder, I shall group these three divisions under the same heading, and describe them together:

a. *Vagino-abdominal;* b. *recto-abdominal;* c. *vesico-abdominal—Examination.*

a. *Vagino-abdominal.*—As the finger passes up the vagina, the other hand is placed gently with extended fingers on the abdomen of the patient (the clothes having first been sufficiently loosened and lifted to give perfect freedom to the hand). As soon as the internal finger has completed its survey of the cervix, and the four quarters of the vaginal roof, the external hand gradually and gently increases its downward pressure, commencing first midway between umbilicus and symphysis over the usual site of the fundus uteri, and endeavoring either to press this body toward the internal finger, or to grasp it completely between thumb and fingers. In this manner an existing ante- or retrodisplacement is aggravated and rendered more clear to the internal finger; or the normal position of the fundus, previously suspected by the absence of a large body in either

vaginal pouch, is assured. Besides the position, the size, shape, and contour of the fundus and body of the uterus may thus be accurately determined, the internal finger pushing the fundus up toward the outer hand, and placing it directly between the two hands. In shape the uterus is best likened to a pear compressed antero-posteriorly (the old comparison of the text-books cannot be improved upon) ; it is two and a half inches long, of which about one inch is intravaginal ; about one inch thick, and nearly two inches wide at the fundus. An experienced touch can readily detect even a slight increase in these dimensions. But it should be remembered (and this is a rule which holds good in computing the size of all abdominal tumors) that one is very liable to overestimate the size of the uterus as felt through the vaginal and abdominal walls, probably because the thickness of its envelopes adds to its apparent size. The size of

Fig. 21.—Bimanual Examination (P. F. M.).

the uterus can usually be ascertained only in this manner, and it is evident that this maneuvre is of the greatest importance in diagnosing moderate enlargement of the uterus, as it occurs during the first two or three months of pregnancy, during subinvolution or areolar hyperplasia, or in intrauterine growths of moderate dimensions. To detect a pregnancy of six weeks by this method (the only means by which it can be detected with any probable certainty, when aided by rational signs) requires unusual dexterity, and especially favorable physical circumstances ; even at two and two and a half months the diagnosis is not always an easy one. The regular spherical outline of the uterine body, and the apparent equality of its antero-posterior and transverse diameters, may, aided by the soft, velvety cervix, assure the diagnosis. Besides, the soft, regular, obscurely elastic feel of the uterus gives an inkling of the presence of fluid. As already stated, to avoid voluntary or reflex contraction of the abdominal walls, the

pressure should be gentle and gradual; the fingers should be but slightly curved, and the parietes pressed inward until some firmer body is more or less obscurely felt. A pawing, or a rubbing motion of the tips of the fingers, whereby the abdominal wall is moved back and forth, or from side to side over the part under process of palpation, or that part is pressed against and again withdrawn from the internal finger, will generally serve to give both hands a touch of all its surfaces. Frequently, in lax abdominal walls, the finger in the anterior or posterior cul-de-sac and the external fingers may be made to touch with only the intervening abdominal and vaginal walls between them, and in such cases the surfaces of the uterus, ovaries, and broad ligaments are readily accessible. Laterally, the double folds of the broad ligaments generally prevent the fingers from meeting.

The beginner usually finds some difficulty in detecting the fundus uteri by bimanual examination; he either presses his fingers too close to the symphysis, or too high up toward the umbilicus. The normal position of the fundus uteri is about three inches above the upper border of the symphysis. By passing the internal finger into the anterior vaginal pouch, and pressing inward and downward toward the symphysis with the other hand, the fundus will usually be found between the two hands.

Besides size, consistence, and outline, the mobility of the uterine body, as influenced by motion of the cervix and the palpating hand, and its sensitiveness are points worthy of notice. The normal uterus is exceedingly movable, especially in the antero-posterior diameter. Excessive mobility, so that the fundus may be pressed down under the symphysis or into the sacral excavation, or an anterior displacement may be charged to a retrodeviation or *vice versâ*, by a few simple manipulations, is indicative of relaxation of its supports; diminished mobility on the other hand, imparting to the finger the sensation of resistance, denotes previous inflammatory thickening or shortening, or possibly non-development, of its supports.

Normally, the fundus uteri is not sensitive to moderate pressure; it has a dense, smooth feel. But, let it be enlarged and its surface irregular through areolar hyperplasia or subinvolution, and the patient will generally complain of more or less acute pain on compression, particularly if the abdominal wall is rubbed over the fundus.

When the position, size, and outline of the body and fundus of the uterus have been ascertained by palpation, the external hand is moved to one side and in the same manner presses the organs situated in the lateral portions of the pelvis toward the internal finger. By alternately pressing downward with the outer hand, and upward with the internal finger, and by rubbing the external fingers over the internal one, the region of the soft, obscure broad ligaments is thoroughly searched, and the normal ovaries are in many instances recognized. Indeed, when the abdominal walls are thin or relaxed, the ovaries can almost always be readily mapped out by this method. When they are enlarged, or enclosed in a shell of plastic lymph, they are invariably detected with ease. It should be noticed

that the sensation imparted to the external fingers is generally more vague, like that of diffuse resistance ; the internal finger, against which the organ is pushed, detects its outline, size, consistence, and mobility. In spare individuals the Fallopian tubes, ovarian and round ligaments can occasionally be touched in this manner.

A firm, immovable body in the broad ligament, like a cellulitic deposit of not very recent date, can usually be enclosed between the fingers of both hands, and its outline clearly mapped out ; the same is the case with small ovarian tumors, cysts of the broad ligament and tube. In this way a unicornite or bicornite uterus may be detected, and the connection of tumors with the lateral uterine wall decided or denied. It is often extremely difficult to decide whether a tumor apparently attached to the side of the uterus by a flat, slender band is a subperitoneal pediculated fibroid or a solid ovarian tumor with its pedicle of broad ligament.

In large abdominal tumors bimanual examination is useful in showing the connection of a growth felt by the internal finger with the bulk of the tumor ; thus, if the external hand pushes the tumor downward, the impulse and descent is felt in the vagina, or if fluctuation is present the wave is detected by the internal finger, unless, indeed, the tumor be divided by septa. Further, a pelvic tumor may be raised by the internal finger, and its connection with the abdominal growth thus demonstrated.

The exercise of simple and conjoined palpation requires a vast degree of practice and a delicacy of touch greatly superior to that needed for mere indagation. The value of bimanual examination to the gynecologist and the results obtained are, therefore, proportionate to the skill of the individual examiner. To detect a pregnancy of six weeks solely by the slight increase in size of the uterine body ; to discriminate between a pediculated subperitoneal fibroid of the uterus and a small multilocular ovarian tumor ; to recognize obscure, deep-seated fluctuation in a cellulitic deposit between the layers of the broad ligaments by the doughy, boggy feel of the tumor ; to map out the extent of an intraperitoneal exudation ; to do all this with absolute certainty requires years of experience and practice, easy though it may seem to the beginner.

b. *Recto-abdominal ;* c. *Vesico-abdominal.*—The details of these methods are essentially the same as those of combined abdomino-vaginal examination. When the finger is in the rectum, the external hand is chiefly enabled to palpate the posterior surface of the uterus and broad ligaments, therefore the ovaries, and retro-uterine or (possibly) retrorectal or retroperitoneal tumors. Retro-uterine tumors may often be more readily dislodged and grasped from above by this method. The distended sigmoid flexure, or a high rectal stricture can scarcely escape detection if this examination be made.

The external hand chiefly serves to press toward the finger in the bladder and steady the fundus and body of the uterus, the anterior face of the broad, round, and ovarian ligaments, and the Fallopian tubes. The ovaries, naturally, although situated on the posterior surface of the broad ligaments, thus become accessible to the internal finger. The differential

diagnosis between small ovarian cyst, cyst of the broad ligament, and hydro- or pyosalpinx, is often to be made only by this method, which enables the examiner to trace the outlines and attachments of the tumor with almost absolute accuracy. The diagnosis between cyst of the broad ligament and monocyst of the ovary is, indeed, possible usually only by the hypodermic needle and the microscope, and then not always with certainty. The ovoid shape of fluid accumulations in the tube may prove an aid to diagnosis. The round ligaments are the seat, so far as I know, of only one variety of disease, a fibromyoma, which is of very rare occurrence. Intrapelvic exudations, extra- or intraperitoneal, may also be mapped out more clearly through the bladder; but it should be considered whether the advantage gained thereby compensates for the danger of urethral dilatation and vesical palpation.

Professor B. S. Schultze, of Jena, has recently described a method of diagnosing the attachment and size of the pedicle of an ovarian tumor, by means of vaginal, rectal, and abdominal palpation. The patient being anesthetized in the gluteo-dorsal position, he introduces the index and middle fingers into the rectum along the posterior surface of the uterus, the thumb of the same hand into the vagina in the same direction; the other hand presses down the abdominal walls from the outside and seeks to grasp the pedicle of the tumor between it and the uterus. At the same time, an assistant, standing near the head of the patient, lays both hands on her abdomen, presses the abdominal walls downward as much as possible, and then alternately lifts the tumor up against the thorax and drops it, also drawing it to one side or the other. The fingers in the rectum, vagina, and on the abdominal walls feeling altogether cannot fail to recognize the size and attachments of the tumor to the uterus or its adnexa.

F. Digital Eversion of the Rectum.

When a patient complains of painful defecation, of bloody, mucous, or purulent discharge from the anus, or of hemorrhoids, it is advisable to

Fig. 22.—Digital Eversion of Rectum (P. F. M.).

inspect as much as can be readily exposed of the rectum. A simple, rapid, and comparatively painless method of exposing to view the lower two to three inches of the rectal mucous membrane is to introduce one or

two fingers into the vagina when the patient is on her side, and attempt to press the tips of these fingers out of the anus. In this manner the mucous membrane of a portion of the anterior wall of the rectum and the edge of the sphincter become visible, and a fissure, ulcer, hemorrhoid, or a catarrhal hyperemia of the mucosa are readily detected. The posterior wall of the rectum cannot be seen by this plan, and but a very imperfect glimpse of it may be obtained by moderately dilating the anus with two fingers. For more complete inspection specula are required.

It may be appropriate here, at the close of the section on non-instrumental diagnosis, to say a few words regarding the normal position of the uterus. Strange as it seems, this question, apparently so easy of solution, still agitates the gynecological mind, and there are probably no two text-books or monographs on gynecology or anatomy in which the author has endeavored to advance his own original views on this subject, which give

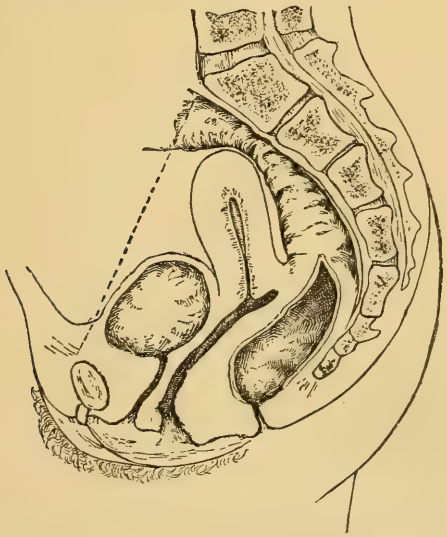


FIG. 23.—Backward Displacement of Uterus by Distended Bladder (P. F. M.).

the same representation of the normal position of the uterus and its adnexa. Nearly all show it slightly anteverted, but some make it anteflexed, others antecurved, and others straight. And all call their diagrams "the *normal* position of the uterus." The best of these views are those of Kohlrausch, modified by Spiegelberg, Hodge, Sims, Thomas, etc. But none of these authors convey to the reader the impression that this position of the uterus is a variable one. Only recently have Schultze and Schroeder in Germany (whose opinions differ), Hach in Russia, and Van de Warker in this country defined the subject more clearly and shown by experiments that the *normal* position of the uterus is a *movable* one. The shape of the

uterus is slightly ante*curved* (not anteverted or anteflexed), its axis almost corresponding to that of the superior pelvic strait (see Fig. 27; I think the position given by Van de Warker in his article in the *Am. Jour. Obst.*, for July, 1878, decidedly too much anteverted, even with an empty bladder), its angle with the vagina measuring about 155°. (See Fig. 14.) *But* this position of the uterus is subject to constant variations. In accordance with the degree of distention of the urinary bladder, the body and fundus of the uterus are moved backward, and this retrogression is increased if intra-abdominal pressure be diminished, as in the recumbent position. (Van de Warker says, *loc. cit.*, "Between the positions of the uterus in an empty and in a full state of the bladder there is a difference of 20° to 30°.") To a slighter degree an overdistended rectum will press the fundus forward. With every variation in intra-abdominal pressure during inspiration and expiration and voluntary motions and positions of the body, the fundus and body of the uterus vibrate back and forth, like a pendulum, with its pivot at the reflection of the vagina on the cervix. It thus follows that we have several normal positions of the uterus, which I have been in the habit of considering as the first degree of normal ante-displacement, and first, second, and third degrees of normal retro-displacement. Their extent is best described by the accompanying diagram.

FIG. 24.—Degrees of Normal Mobility of the Uterus. The solid outline indicates the average position (P. F. M.).

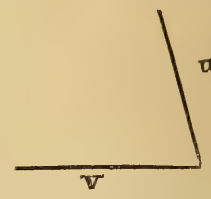


FIG. 25.—Utero-Vaginal Axis in Normal Relation of Organs. v, vagina; u, uterus (P. F. M.).

As regards the average normal position of the uterus, my experience leads me to adopt the view of the late Professor E. Martin, of Berlin, who held that with the woman in the recumbent position, the examining finger is unable to touch the body of the uterus before or behind the cervix if the uterus is normally situated; as soon as the vaginal finger can feel, be it ever so little, of the uterine body through the anterior or posterior vaginal pouch, the uterus must be considered to be proportionately ante- or retrodisplaced. In the erect posture the body of the uterus will naturally tilt forward a little, and may be indistinctly felt through the anterior vaginal wall. Figs. 1 and 7 seem to me to show the relations pretty correctly.

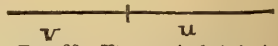


FIG. 26.—Utero-vaginal Axis in Retroversion of the First Degree. v, vagina; u, uterus (P. F. M.).

It should be remembered that the normal relation of the axis of the vaginal canal is nearly at a right angle with that of the uterine canal (Fig. 25). When the woman assumes the recumbent position this relation is maintained; but it should be borne in mind that the fundus uteri then always remains slightly above the promontory of the sacrum. Let the fundus sink below the promontory, and the cervix therefore point toward the vaginal outlet—that is, the vaginal and uterine canals be in the same, or nearly the same, axis (Fig. 26)—we have retroversion in the first degree, whether the woman be in the erect or recumbent posture. The relations between vagina and uterus and between the fundus uteri and the promontory of the sacrum are the guiding points in determining posterior displacement of the uterus.

The relations of the various axes of the pelvic canal, vagina, and uterus to the perpendicular axis of the whole body are shown in Fig. 27.

The third degree of normal posterior mobility of the uterus must thus correspond about to the normal position of the uterus in the recumbent posture, and the first degree of anterior mobility might indicate the physiological forward inclination of the organ in the erect posture. A more marked anterior inclination, or even a slight flexion, as some authors assert, I for my part have certainly never been able to accept as the healthy, natural position of the uterus.

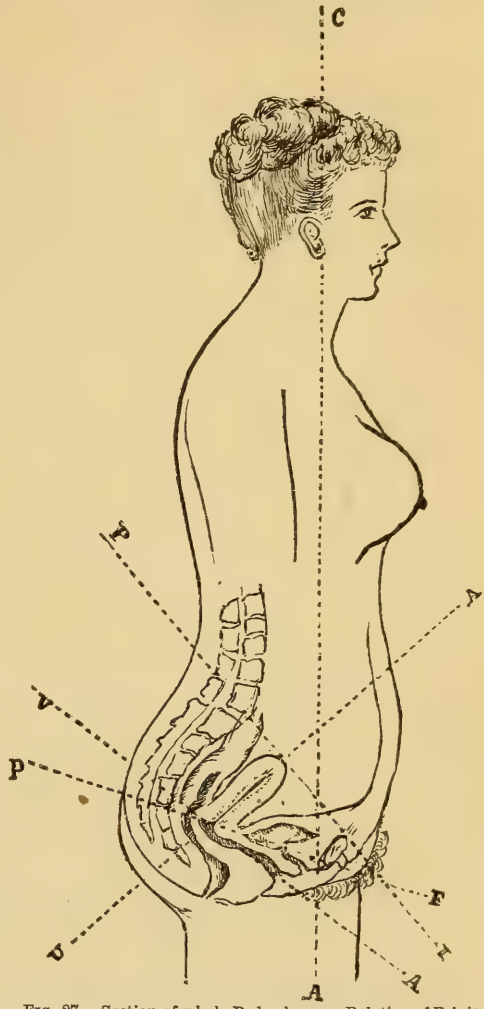


FIG. 27.—Section of whole Body showing Relation of Pelvic Organs to the Perpendicular Axis of the Body. C, A, corporeal axis; V, A, vaginal axis; U, A, uterine axis; P, F, pelvic floor; P, I, pelvic inlet (P. F. M.).

6. Examination by Means of Instruments.

Disinfection of Instruments.—Before proceeding to enumerate and describe in detail all the instruments in use for the diagnosis and treatment of the diseases of the female genital organs, it may be well to make a few general remarks as to the precautions to be observed in employing them. Such special accidents as may arise from certain instruments will be described in their respective sections, but there is one great and universal source of danger which is very slightly touched upon in the text-books, and which, I think, is very generally overlooked by the profession, viz.: *want of cleanliness of instruments.* When we consider how easily septic or infectious matter may be transmitted, not only on the fingers, but on specula, sounds, tenacula, knives, forceps, etc., from one patient to another, it is evident that the most scrupulous cleanliness should be observed as regards the instruments used in an examination or operation before again employing them on another patient. And as it is exceedingly difficult to thoroughly remove all secretions from the complex instruments referred to, the only safe way is to steep them after each examination in boiling water, then lay them for a few moments in a five per cent. solution of carbolic acid, and finally leave them in a one per cent. solution of the same disinfectant during the examination. I always make it a practice to remove all mucus or other excretion from the forceps, tenaculum, or sound, by dipping it in the basin of warm carbolized water in which the metal instruments to be used are kept at my right hand during every examination. Besides, I think it a good plan to anoint speculum, sound, and tenaculum with two per cent. carbolized vaseline. After an operation, the complex scissors and forceps used should be separated, each blade carefully washed, carbolized, and polished until every sign of discoloration disappears. Carbolic acid, it is true, spots the bright surface of steel instruments, and thereby annoys the neat surgeon. But carbolic spots are a sign of disinfection and cleanliness, and consequent safety from septic infection; and herein must lie the consolation for the tarnished instruments.

If it were feasible, a mild carbolized vaginal injection before every examination would be advisable. Before an operation on the intravaginal organs it is always possible to order such a precaution, and in case of need the vagina may be mopped out by the operator with a stronger (five per cent.) solution before proceeding to operate.

While the question of septic infection through floating or otherwise transmitted germs and the possibility of killing these germs by carbolic acid, must still be considered unsettled (Lawson Tait omits carbolic acid entirely in his operations), one thing is certain, viz., that by the careful and frequent washing and immersion of our instruments in carbolized water, we insure their *absolute* cleanliness, and that is the main point. Hence, whether the carbolic be indispensable to safety or not, I recommend and use it as a disinfectant.

As regards the disinfection of the hands, I find tar-soap applied with a brush very pleasant and effectual. If desired, a one-tenth per cent. solution of thymol may be poured over the hands.

While what has here been said applies to every vagino-uterine examination or operation, no matter how trivial, in larger operations, such as ovariotomy and hysterectomy, where the enormous absorbing surface of the peritoneum is exposed, the above precautions will naturally be vastly intensified.

Particularly should sponges be cleansed, boiled, and disinfected with scrupulous care, and if the least doubt exists as to the possibility of thoroughly cleaning them, they should be thrown away. I always have my sponges boiled in five per cent. carbolized water, then washed in clean water, and again soaked in five per cent. carbolic and squeezed dry before each operation. The difficulty of thus cleaning sponges is the chief reason why I do not use them during ordinary examinations to cleanse the vagina and cervix, but prefer absorbent cotton, which is thrown away when soiled. Besides, the character and color of the secretions is better seen on the white cotton than on the brown sponges.

The sponges used during operations (both small sponges for mopping up blood, and large flat ones for protecting the intestines and covering the abdominal incision during laparotomy), are prepared for each operation after the following method :

1. They are freed from sand and other impurities by thorough beating.
2. They are immersed in a two to three per cent. dilution of pure hydrochloric acid, for from ten to fifteen minutes, and are then washed until the water no longer shows an acid reaction.
3. They are thoroughly immersed in a one per cent. solution of permanganate of potash, well washed with pure water, and squeezed dry.
4. They are again immersed in a bleaching fluid composed of one ounce each of hyposulphite of soda and hydrochloric acid in one quart of water (which must always be prepared fresh), are again thoroughly washed in pure water, soaked in a two per cent. solution of carbolic acid containing two ounces of glycerine to the quart, squeezed dry, and preserved in well-stoppered glass jars.

The small fragments of sponges used on sponge-holders in cervix and perineum operations can either be thrown away after each operation (the better way) or be thoroughly boiled in a ten per cent. solution of carbolic acid, soaked in the solution of glycerine and carbolic acid above mentioned, and preserved in jars. As a rule, all chance of the transmission of infectious matter after operations in which only blood is mopped up is prevented by the latter treatment.

Since the introduction of the unquestionably much more powerful germicide, corrosive sublimate, I have substituted it for carbolic acid during operations, soaking sponges in a one to one thousand parts solution for some time before the operation, and then washing the sponges during the operation in a one to two thousand solution. The instruments are so much tarnished by keeping them in a corrosive sublimate solution, and the operator's hands in time become so affected by it, that I have adopted the practice of keeping my instruments thoroughly cleaned and polished, and washing my hands during an operation in sol. thymol or listerine.

A. *Examination of the Urethra and Bladder by Sound, Catheter, or Speculum.*

Indications.—When a patient complains of painful, too frequent, or too scanty micturition, or when the finger in the vagina detects an unusual sensitiveness of the urethral body or vesical base, it may be desirable to explore the urethra and bladder by means of instruments or the finger. Conditions of the *urethra* producing the above symptoms are : caruncles, fissure, ulceration, simple spasmodic contraction of the circular fibres at the vesical neck ; of the *bladder :* acute and chronic cystitis, stone, neoplasms (villous cancer).

Counterindications.—To the gentle introduction of a sound or catheter into the urethro-vesical cavity there can scarcely be an objection ; the use of a urethral speculum or endoscope necessitating previous dilatation of the urethra would be counterindicated by the same conditions interfering with mere dilatation and given under Vesical Touch, viz., excessive fragility of the urethral wall and recent inflammation of the pelvic tissues.

Method.—A uterine sound, ordinary male or female metallic or elastic catheter, can be introduced into the normal urethra and thence into the

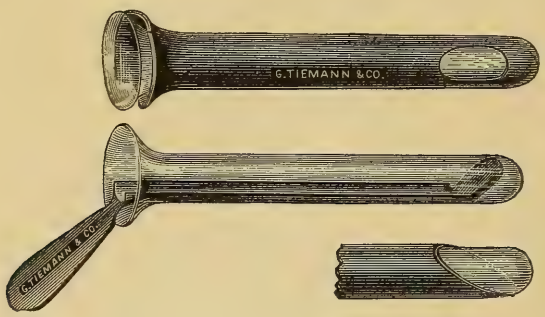


Fig. 28.—Skene's Urethral Endoscope.

bladder with no difficulty and very little pain. No obstruction is ordinarily met with at any point of the canal, and pain is experienced only at the junction of urethra and bladder, and when the instrument strikes against the opposite wall of the bladder. If the parts are inflamed, if urethritis and cystitis are present, the maneuvre will be painful, the more so the more acute the inflammation. If a tender point has been detected the exact spot may be more accurately examined by pressing the finger in the vagina against the intravesical instrument. Tenderness at the vesical neck may mean a fissure or ulceration of that spot. If bleeding follows the exploration, there may be intra-urethral vascular growths or caruncles, or fissures, or ulceration ; or an abrasion of the vesical mucous membrane may be the seat of the hemorrhage.

Where absence of the uterus or ovaries is suspected, the tissues above the vaginal pouch may be searched with tolerable accuracy between the

finger in the rectum and a catheter or sound in the bladder. This manipulation is particularly valuable in suspected congenital absence of the organs named, and in inversion of the uterus.

When it appears desirable to inspect the mucous surface of the urethra, the expansion of the canal by any dilating instrument, such as ordinary dressing-forceps or uterine dilator, will often suffice. Thus an ordinary hairpin, with its points fixed in a cork, may dilate the meatus sufficiently to give a view of the first half of the canal. Special instruments for the purpose have been devised by Barnes, Skene, and recently by Dr. Alex. W. Stein, of New York. Barnes' instrument acts on the principle of a tubular speculum, with a slit along nearly its whole length, for the purpose of catching a caruncle, and presenting it ready for removal; Stein's speculum is a simple tubular dilator, which is to be gradually pressed inward until it passes the neck of the bladder, and then used as an endoscope for that organ, the different sections of the mucous membrane being one after the other brought into its focus. It is a very serviceable instrument, decidedly superior to that of Barnes, both for inspection and operation. A useful urethral dilator is the ordinary nasal speculum. Besides the speculum shown in the cut, Dr. Skene has devised an endoscope for the urethra and bladder, which consists of a glass tube, precisely like an ordinary test-tube, varying in size according as it is to be used merely for urethral exploration, or is to be passed into the bladder, and of a section of a cylinder made black and having a mirror attached at rather an acute angle at its distal extremity. The glass tube is introduced first, into it the section with the mirror, and with an ordinary forehead-mirror light is thrown on the mirror in the tube; the shifting of the tube-mirror, forward and backward or from side to side, exposes the various parts of the lining membrane of the bladder. The smaller size may possibly be used on the unprepared urethra, but, as a rule, to avoid breaking the glass tube, and indeed to gain a view which will be of any use at all, it is advisable to dilate the urethra, at least to the diameter of the little finger, before introducing the endoscope. Dr. Skene says that the pressure of the tube will give the mucous membrane a paler color than normal, but that this only serves to bring out more forcibly the inflamed portions. By pushing up the bladder walls from the vagina below, and the abdominal surface above, the whole interior of the organ can be brought successively within the focus of the endoscope.

FIG. 29.—Skene's Urethral Speculum.

An improvement on this endoscopic inspection of the collapsed bladder has been introduced by Rutenberg, who has made a very thorough study of this subject. He found that the walls of the collapsed bladder prolapsed against the lumen of the endoscope, and interfered with vision. He therefore distended the organ with water, which was too opaque and dimmed the mirror, and then with air, which is pumped into the bladder through the tube shown at *a* in the adjoining cut. The speculum is made

of German silver, of equal size at both ends, and of 19 mm. inside diameter; on this speculum (of which there are various sizes) is screwed the top with piston-rod for the mirror shown in the cut. At *b* is a glass window, and at *a* the tube to which the rubber tubing for the injection of air by a balloon is attached. The distention of the bladder is always painful; the examination should, therefore, always be made under an anesthetic, even when previous dilatation of the urethra is unnecessary. The bladder is first emptied of urine, and the speculum then introduced into the dilated urethra in the gluteo-dorsal position, the top is screwed on, and the bladder filled with air from the balloon by one assistant, while the other holds the lamp for reflection over the patient's pubis. The light is thrown into the bladder with an ordinary concave mirror. The endoscopic mirror is needed for the inspection of all parts of the bladder except the posterior and posterior inferior portion. The details as regards warming the mirror peculiar to a laryngoscopic examination also apply here. The distention of the bladder was found by Rutenberg to change the color of its mucous lining from dirty grayish red to light red, and to expose all the fine ramifications of vessels, and even fasciculi of muscles. The mouths of the ureters were never visible except after they were found with the sound. Winckel, whose experience in this branch has been large, pronounces Rutenberg's method to be entirely devoid of danger as regards insufflation of air into the ureters, and in any other sense, and to be a very valuable contribution to the diagnosis of bladder affections. He found the light of an ordinary petroleum argand burner placed over the pubis quite sufficient for purposes of reflection.

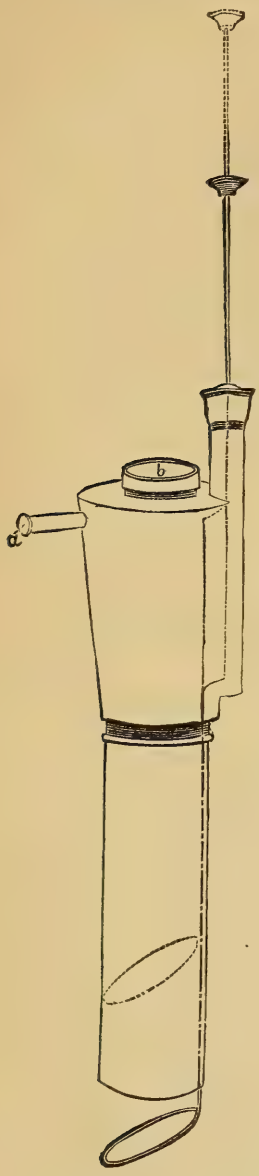


FIG. 30.—Rutenberg's Endoscope.

The direct application of medicinal agents to diseased portions of the bladder mucosa is also rendered feasible through Rutenberg's endoscope.

The field of vision afforded by all these specula and endoscopes for the urethra and bladder naturally is but a small one, corresponding with the limited dilatability of the urethral canal, and their practical utility therefore in no way equals that of specula for other passages. Still, without them the diagnosis of urethral and vesical disease may often be entirely impossible.

The late Professor Simon, of Heidelberg, practised and taught the introduction of sounds through the dilated urethra into the mouths of the ureters, for the purpose of detecting abnormal conditions of these ducts. What was undoubtedly possible to his acute touch will scarcely be feasible for us without an amount of practice entirely out of proportion to the benefit to be derived from the operation. A practitioner so well versed in vesical disorders as Winckel, says that "notwithstanding great perseverance he never was so fortunate as to find the canal (of the ureter) with the sound." For completeness' sake I will merely say that the finger passed through the dilated urethra detects the nodule marking each ureteral mouth about

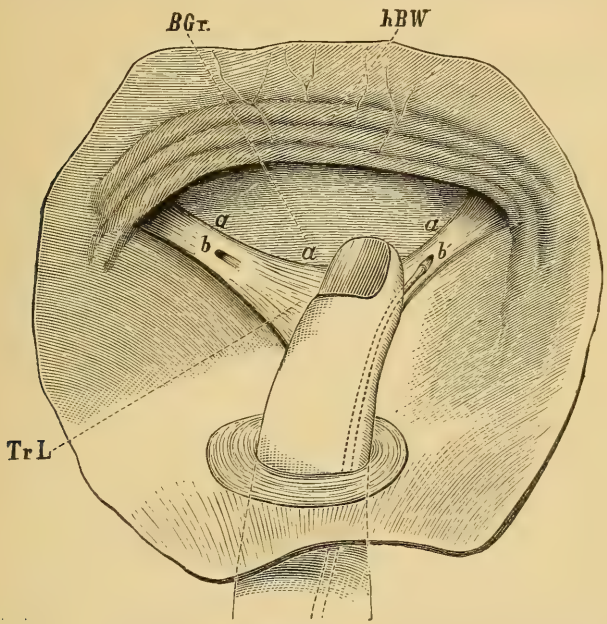


FIG. 31.—The Finger in the Bladder touching the Mouths of the Ureters (Winckel). *BGr.*, *a a a*, base of bladder; *b b*, mouths of ureters; *TrL*, interureteric ligament: trigonum vesicæ; *hBW*, posterior wall of bladder.

one inch from the sharp vesical neck on the so-called interureteric ligament about 1.25 to 1.60 ctm. each side of the median line. If the nodule is distinctly felt, Simon claims that a long, blunt-pointed sound or catheter can be passed along the finger into the slit, and by pressing the handle of the sound toward the opposite ramus of the pubic arch, into the ureter, even up to the renal pelvis. Simon succeeded seventeen times in eleven women in this maneuvre, without injury to the patient. He advocated it for the diagnosis of ureteral and renal calculi, ureteral stricture, and the cure of hydronephrosis. The cases in which it will be indicated are obviously rare, and the evident danger of inflicting injury will suffice to prevent the too frequent employment of this exceedingly difficult maneuvre.

B. *Examination of the Vagina, Cervix, and External Os with the Speculum.*

Indications.—Not every patient who has been subjected to a digital examination of her genital organs need necessarily be examined with the speculum. The finger and the sound may have told us all we can expect to find in the case, and at all events they have shown us the absence of a necessity for further exploration. Besides, there are various conditions, hereafter to be enumerated, which counterindicate a specular examination. But I think myself justified in laying down the rule, that every patient who comes to us for a *first examination and a diagnosis* deserves to have her case investigated by every proper means at our disposal, and that we should omit no measure which may give *us* the fullest possible insight into her case, and *her*, therefore, the best chance for cure. I therefore make it a practice to examine every patient who comes to me for diagnosis and treatment *the first time*, not only with the finger and the sound, but also subsequently with the speculum, and have frequently had cause to commend, seldom to regret, this practice. Of course, the presence of a hymen, and other counterindications will modify this rule to some extent, both as regards sound and speculum.

Special indications for a specular examination at any time are the detection by the finger of conditions of the vagina or cervix which require to be verified or corrected by the eye, such as granular vaginitis, laceration, erosion, ulceration, follicular or cystic hyperplasia, carcinoma of the cervix; patulousness of and discharge from the cervix; a leucorrheal or sanguineous discharge, the origin of which, from vagina, cervix, endometrium, or perhaps pelvic abscess opening into the vagina, only ocular inspection can decide. Thus, a soft pulpy condition of the cervix will often be seen through a speculum to be due to cervical hyperemia and erosion, or the bloody tinge on the examining finger is shown on specular examination to come from a catarrhal erosion of the cervix, and the origin of the supposed prolonged menstrual flow is thereby explained. Recently, in a case of profuse, offensive, purulent vaginal discharge in an old lady, what I first supposed to be a senile vaginitis, proved, through the speculum (introduced for the purpose of inserting medicated tampons) to be a large pelvic abscess opening into the posterior vaginal pouch by a small opening; the filling of the vagina with purulent fluid in gushes whenever the Sims was pressed tightly behind the cervix led to the suspicion of the true nature of the case and the discovery of the at first invisible opening into the abscess.

Counterindications.—The objections to a specular examination are, 1. The needlessness of such an exploration, as evidenced by previous indagation. 2. The presence of a hymen or other obstacle to the introduction of the instrument (such as ulceration, acute inflammation, stricture or atresia of the vagina). 3. Excessive sensitiveness of the vulva (vaginismus) or vagina, or nervousness of the patient. 4. The probability of doing harm by the examination, as of exciting fresh hemorrhage or interfering with union after plastic operations.

That none of these objections, except absolute physical impossibility of introducing the speculum, are positive obstacles to such an examination is obvious, when the necessity therefor becomes imperative.

Varieties of specula, and methods of using them.—There are three chief varieties of vaginal specula: 1, cylindrical or tubular; 2, bi-, tri-, or quadri-valvular, or expanding specula; and 3, the duck-bill or Sims' speculum. Of all these varieties there exist numerous modifications and combinations, the number of which is legion, and the mechanism often so complicated, or differing so little from the conventional shape as to be either indescribable or unworthy of description. As every "rising" gynecologist seems to consider it a duty which he owes to the specialty to invent either a speculum or a pessary, I shall be compelled to confine myself to the description of such instruments as have been tested and found pre-eminently useful and practical over their competitors, and to refer my readers for a full list to the catalogues of the instrument-makers.

1. *The Cylindrical Speculum.*—The most popular, because the most convenient, are the cylindrical or tubular specula. They are manufactured of various substances—wood, metal, glass, gutta-percha, hard rubber, horn. The materials most ordinarily used are glass, hard rubber, and metal. Those of glass and metal give the best light, but are relatively more expensive than the hard-rubber tubes, the glass because they are so fragile, and the metal (brass or nickel-plate) because they soon tarnish and become dim and require polishing or replating.

The specula of milk-glass devised by Mayer, of Berlin, are certainly more practical than those of Fergusson, which are composed of clear glass covered by tinfoil and a thick coating of polished rubber enamel. The milk-glass specula readily nick at the edge, it is true, and are then useless, but the enamel covering of the Fergusson chips off at the vaginal edge at the slightest violence and becomes brittle at a low temperature. Besides, the excessive refraction of the Fergusson is unnecessary, and the light given by the milk-glass quite sufficient. While the glass specula are not affected by the contact of any medicinal agent, even the strongest acids, the metal instruments do not permit the use of any, even the mildest caustic, such as a solution of nitrate of silver, or tincture of iodine. Neither of these materials, moreover, allows the contact of heat, as the actual or thermo-cautery, for more than a few seconds, the glass being liable to crack, and the metal to become hot. The most practical tubular specula are undoubtedly those of hard rubber, which are light, durable, and relatively inexpensive. I have a set which I bought at Leiter's, in Vienna, fourteen years ago, and have had in constant use since, wherever a tubular speculum was indicated, and they are still as good as new. This set consists of five specula, ranging in diameter from $\frac{3}{4}''$ to $1\frac{3}{4}''$, and in length, from $4\frac{3}{4}''$ (the smallest) to $5\frac{1}{2}''$; measuring from the expanded flange. They slide one into the other, being kept together by a cap, and are therefore exceedingly portable. They are not affected by any agent, or by heat, except, perhaps, a slight superficial discoloration; they are not fragile, and do not chip.

The only objection to them is that their dark surface does not reflect the light as well as could be desired, particularly on a gloomy day, and when the smaller sizes are used. By means of a simple laryngoscopic head mirror or reflector (to be described hereafter) this objection may be overcome.

I have recently been shown by Mr. Philip H. Schmidt, instrument-maker, of this city, a set of these hard-rubber specula, lined with nickel-plated brass and thus giving an excellent reflection. The objection to all metal specula, of tarnishing, applies to them, also, but the occasional cost of replating is but trifling.

Recently I have been shown a set of three tubular specula made of celluloid. They are white in color, and therefore reflect exceedingly well. Besides, they are exceedingly light, durable—for they can be thrown on the floor without damaging them in the least—and are not affected by acids. Only absolute alcohol and camphor injure them. They are not expensive, costing about one dollar a speculum. In short, they are, in my opinion, the best cylindrical speculum in existence. They can be had of F. G. Otto & Sons, New York.

Tubular vaginal specula should vary in diameter from $\frac{1}{2}''$ to $2''$, and in length from $4''$ to $6''$, never longer than the latter. A short speculum will

Fig. 32.—Set of Hard-rubber or Metal Cylindrical Specula.

keep the cervix within easy reach, for touch and vision, while a long tube pushes it away and renders it less accessible. This is not, however, of importance for indagation, as some authors state ; for what the touch can tell us about the cervix should have already been ascertained before the speculum is introduced ; but, in order to enable us to see the cervix and reach it readily with forceps and other instruments. Thomas has devised what he calls a "telescopic" speculum, but I am not aware that it has ever become popular, probably because a long speculum can be shortened by not introducing it to its whole length, and specula are no longer made too long ; and finally, because tubular specula are now rarely used for anything more than inspection, and the introduction of some medicinal agent into the vagina, but never for any greater operations on the cervix than the passage of the sound, or division of the external os, or scarification of the cervix.

Cylindrical specula are now always made with a trumpet-shaped expansion at the outer end for the purpose of admitting more light, and are generally bevelled off at the inner extremity partly to facilitate introduction and partly on account of the greater depth of the posterior pouch of

the vagina into which the bevelled point fits. Some specula are made square cut at the inner end, but the bevelled ones are preferable.

The tubular speculum will always retain its popularity with the general practitioner, who but rarely has to make a specular examination and merely desires to catch a glimpse of the cervix uteri, often with no particular object in view, and hence with no result; besides, not requiring assistance and being simple in construction and cheap, it naturally answers several requirements. As already stated, for inspection of the vaginal walls and cervix, for application of fluid or pulverized medicinal substances to these parts, for the introduction of medicated tampons, for the application of leeches (where, indeed, it is almost indispensable) for scarification of the cervix, and even for division of the external os; for the introduction of the sound or probe, and frequently of cotton-wrapped and medicated applicators, the cylindrical speculum (especially the larger sizes) answers every purpose, and is, therefore, by no means to be discarded, even by the specialist. Thus, in very capacious vaginæ with flabby walls, I often find a large, short tubular speculum much more convenient for examination and treatment of the cervix than either a bivalve or Sims, through which latter manipulations are interfered with by the constantly prolapsing vaginal walls. But with these applications its field of utility ends. The operations for laceration of the cervix, or for vesico-vaginal fistula, or of division of the os internum, would be impossibilities, if we had to attempt them through a tubular speculum. Even the introduction of the sound or applicator may be difficult or impossible through the tube, if the uterine canal is tortuous, as in anteflexion, or narrow.

While, therefore, for all the really important technical and operative procedures in modern gynecological practice, the tubular speculum is inadequate or useless, and has long since, in the hands of specialists, given way to the incomparable duck-bill of Sims, still there are certain conditions in which it is a convenient and useful instrument; and writing as I am, not for the specialist, but for the beginner and general practitioner, I feel that they will thank me for instructing them in its use, even though I but rarely employ it myself. While freely accepting the new, it is not well to entirely cast away the old, when our own or our patient's comfort seems increased by our conservatism.

The size of speculum most commonly called for is that corresponding to No. 3 of my hard-rubber set, one and a quarter inch outside diameter. The practitioner should, however, possess the set of these, or equivalent sizes of milk-glass specula, a few of which latter are always useful in dark weather or, in the smallest size, for unmarried women.

Introduction.—The ordinary position for introducing a cylindrical speculum is the dorsal, as already described. The patient is covered with a sheet, which is so wound about her legs as to hide them from view and expose only the vulva. The physician stands between the thighs of the patient slightly toward her right side, seizes the trumpet-shaped expansion of the otherwise well-anointed speculum with the full right hand, and while the thumb and index-finger of the left hand separate the labia and

expose the vaginal orifice, passes the bevelled end with the point against the posterior commissure into the vaginal orifice. As soon as the bevelled point is fairly engaged under the pubic arch, steady backward pressure is made on the perineum with the speculum until the short portion of the bevelled extremity is below the bulb of the urethra and therefore below the pubic arch also, when the point is gently pushed inward and whatever resistance may have been experienced ceases. Either by gentle rotary movements or steady upward pressure (it is immaterial which), the speculum is passed inward, the physician noting the color and appearance of the mucous membrane of the vagina and the character of the secretion, if any exist, and the cervix sought for, the position of which organ, be it remembered, should always have been ascertained by previous indagation. If this precaution has been neglected the cervix may often elude the speculum for some time, especially if a displacement of the uterus is present. The cervix is recognized chiefly by its central opening, the os, but also by peculiarities of superficial appearance frequently met with in that part (erosion, enlarged follicles), and by its resistance to the further advance of the speculum. Some experience is required always to recognize the cervix, particularly in the nullipara whose cervix is unfissured and generally of exactly the same color as the vaginal mucosa; folds of vagina often interpose in the lumen of the tube and by their transverse rugæ simulate the external os, but such folds can be pushed aside by sound or forceps and their true nature thus easily detected. Ordinarily the speculum pushed straight backward and upward in the axis of the vaginal canal will meet the cervix about three inches above the orifice; but if the body of the uterus be displaced backward, forward, or laterally, the point of the speculum must be directed in the opposite direction to find the cervix. Occasionally I have found it so difficult to engage the cervix in the lumen of the tube, that I have introduced the sound into the uterus, and passed the speculum over the sound, and frequently it is found necessary to draw the cervix into the speculum with the tenaculum.

Besides this difficulty of finding the cervix, I have noticed beginners to have trouble in inserting the point of the speculum well into the vaginal orifice, or rather, they would attempt to push the point beyond the line of the symphysis without first depressing the perineum, as above described. The result was the causation of great pain to the patient, whose urethral bulb was thus caught by the edge of the speculum and forcibly pushed inward, and the inability of completing the introduction. All this is avoided by carefully following out the rule above described, always to depress the perineum thoroughly with the speculum (this gives little or no pain) before attempting to pass it under the pubic arch. This obstacle overcome, the remainder of the manipulation is painless, unless the instrument be too large, the parts inflamed, or the point pushed too forcibly into the vaginal pouch. Occasionally, the perineum is so rigid and the contraction of the levator ani muscles so excessive, as to render the introduction of the speculum difficult or impossible; such rigidity or contrac-

tion may be normal to the patient, but it is generally due to reflex action produced by fear, and the first touch of the speculum.

I have a patient, whose capacity readily admits the largest size (2″ diameter), but whose perineal and levator ani muscles contract so forcibly at every examination, that even the finger meets with opposition, and every specular examination (with whatever form of speculum it is made) causes decided expressions of pain on the part of the patient. The presence of a urethral caruncle, which has been inadvertently touched by the operator, may also give rise to the same reflex spasm. Pendulous nymphæ occasionally form a momentary obstacle to the insertion of the speculum.

The cervix once engaged in the speculum, one of the first points to notice is the presence and character of discharge from the os, whether it is thin, glairy, purulent, discolored. Attention should then be paid to the size and color of the cervix (normal, pale pink, or purple or mottled), the size of the os (normal, round, transverse, or patulous), the nature of its edges (smooth or fissured). A purple color of the cervix may mean pregnancy, or may only indicate the venous hyperemia of subinvolution ; or it may, indeed, be caused by the pressure of a too tightly fitting speculum. A mottled appearance, small, yellow, semi-opaque dots scattered over the pink surface, show occluded follicles, retention cysts, so-called ovula Nabothi. The eversion of the bright red and rugous cervical mucosa by the circular pressure of the speculum should not be mistaken for an erosion or "ulceration" of the cervix ; the diagnosis is easily made by slightly withdrawing the speculum when the everted cervical mucosa will become reinverted, and the red surface disappear, while an erosion remains unchanged. It is not always easy, however, to differentiate between these two conditions, when there is a deep laceration of the cervix, the lips of which are so much everted and hyperplastic (like a split celery-top—Goodell), that they cannot be included in the speculum ; all we see then is a large, raw-looking surface entirely filling the opening of the speculum, and looking exactly like an indolent ulcer. This is the condition so long considered to be and called "ulceration of the womb," when the cylindrical speculum was the only one in use, and for that matter, still so termed and treated accordingly by many practitioners of the present day, to whom the Sims speculum is an unknown quantity. The diagnosis in such cases should be made by the finger, and the appearance of the everted surface merely verified by the speculum.

In hyperplasia and epithelioma (cauliflower growth) of the cervix, the latter may also be so much enlarged as to exceed in diameter the lumen of even the largest speculum.

In cases where the cervix is very much displaced, especially if it or the fundus uteri is fixed by adhesions, it may be impossible to get it into the speculum.

I have described the dorsal position as the one in which a specular examination should be made, and it is indeed that universally employed for the purpose. Only in some English text-books is the lateral position recommended. Since I have adopted the Sims speculum for every examina-

tion, I have also been in the habit of introducing the tubular and bivalve specula in the lateral position, and have found this practice in nowise inferior, and in some respects greatly superior, to the dorsal position. The chief advantage of the lateral position is that the patient is much less exposed, as the sheet can be so arranged as to cover her completely, leaving only the vulva in sight, without becoming disarranged and obstructing the view, as so often happens in the dorsal position when it is not retained by an assistant or nurse. At all events, the patient's face is so placed that she cannot see how much she is exposed, or what the physician is doing. The comfort of feeling that the patient is not watching one's every expression and movement has but to be experienced in order to be appreciated. Another advantage of putting the patient on the side for every specular examination is, that the position will not require to be altered again for the use of the Sims speculum, or the digital eversion, or the examination of the rectum.

The details of the introduction of the speculum are the same as those described ; the left hand merely lifts the right labium majus, whereby the labia are separated and the vulvar cleft made to gap ; the point of the speculum is inserted and the perineum depressed in precisely the same manner as in the dorsal position, the physician standing slightly behind the patient. The speculum should be passed rather more backward in this position, as the normal antecurvature of the uterus is slightly increased to anteversion, and the cervix, therefore, stands rather nearer the sacral excavation, than in the dorsal decubitus. It should be remembered that the longer end of the speculum is always to go behind the cervix, which can be regulated by introducing the speculum as above directed, and not rotating it.

2. *The bi- and trivalve specula.*—As the chief desiderata of tubular specula are durability and reflection of light, so are those expanding specula the best which are the least complicated and permit the widest separation at their vulvar end. All bi-, tri- and quadrivalve specula are so constructed as to have the fixed point of their branches at the vulvar portion of the instrument, where the screws or levers are situated which separate the blades. Thus the distal ends are more widely separated, while the vaginal orifice is comparatively but little distended.

These specula are made of metal, at the present time all nickel-plated. While more expensive than the round specula, they are more durable and less likely to get out of order, merely requiring occasional replating. Formerly, many plurivalvular specula were made with four, five, and even six blades, but at the present day it is conceded that two and, chiefly, three-bladed instruments answer every purpose attainable by a speculum of this construction. The blades are in the vast majority of instruments expanded in the antero-posterior direction, and many specula have a slit at the vulvar end of the upper blade to prevent pressure on the urethra. The inner ends are well levelled and rounded off, and the branches approximate so closely as to offer no obstacle to introduction. A few specula, bivalve and trivalve, are so constructed as to expand laterally. As a rule, the

trivalve specula consist of one posterior concave blade, and two slightly curved anterior blades, which separate in the antero-posterior diameter, the anterior blades being so curved as also to distend the vaginal pouch laterally to a slight extent. The posterior blade is generally longer ($4\frac{1}{2}''$) than the anterior ($4''$), corresponding to the greater length of the posterior vaginal wall. For the same reason as mentioned in speaking of the cylindrical, the valve specula should not be too long, certainly not longer than $5''$. A long speculum pushes the cervix up, while one just long enough to reach behind the cervix, when expanded, naturally shortens the vaginal canal and brings the cervix down into its lumen.

The advantage claimed for the plurivalve specula is the greater exposure of the vaginal walls ; but this advantage is more or less counterbalanced by the diminished reflection of light, and by the tendency of the vaginal walls, when lax, to crowd between the blades of the speculum. Trivalve specula certainly possess greater degrees of expansion than bivalve, and are therefore usually more serviceable if any manipulation is intended on the cervix or endometrium ; and if it is advisable to inspect the posterior vaginal wall (say, for a recto-vaginal fistula) a quadrivalve may even be indispensable. For mere inspection of the vaginal pouch and cervix a bivalve with fairly large vulvar ring will generally answer.

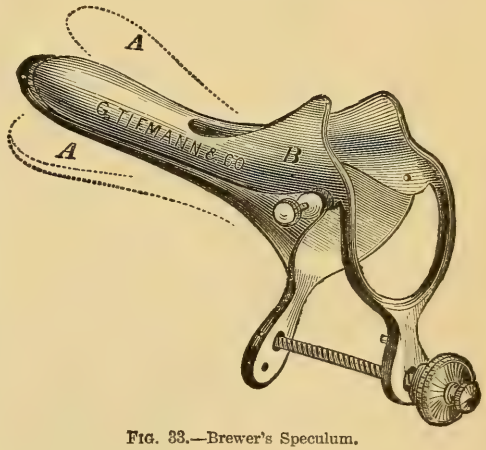


FIG. 33.—Brewer's Speculum.

Of the older bivalve specula, the Cusco was the most popular, and is still mentioned in every text-book. In its original, unimproved form it no longer deserves approval, for its length is $5''$ and while its internal expansion is sufficient ($3''$) its vulvar orifice is so small ($1\frac{1}{4}''$) as to admit but little light and permit of scarcely any operative procedure on the cervix. In its modified form, it is shorter, has a wider valvular expansion, and is a tolerably serviceable instrument. Of the valvular expanding specula now in use, I shall mention a number in their order of practical utility (so far as my experience goes), beginning with the best and referring for the description of the individual instruments to the catalogues of the instrument-makers. *Bivalve :* Brewer's, Hunter's, Goodell's (lateral expansion), Pallen's, Leonard's, Cusco's improved. *Trivalve :* Nott's, Ball's, Nelson's, Meadows'. *Quadrivalve :* Meadows'. I presume my preference and discrimination in the order of these specula will not meet with universal approval ; usually, every inventor considers the product of his brain the best. But, having put the beginner in search of a speculum on the track, I must leave him to create his own preference. Every one of the specula mentioned is a serviceable instrument, as doubt-

less are many others with which I have not become acquainted. I myself possess a Brewer (which, besides, has the occasionally useful quality of being transformable into a Sims by reversing the blades) and a modified Nott (in which the vulvar ring can be greatly enlarged by a sliding apparatus, to be described hereafter in connection with the combined specula), and cannot imagine the necessity for a greater variety. In case of need, the

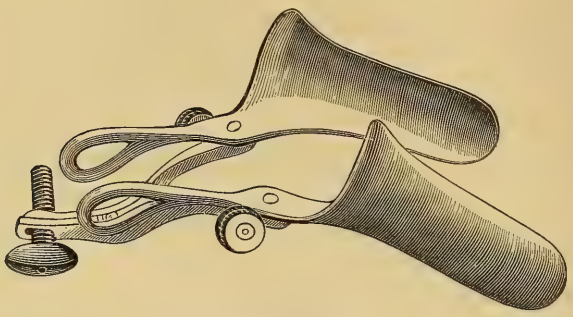


Fig. 34.—Goodell's Speculum.

posterior vaginal wall can be exposed by simply turning the two anterior blades backward.

Bi-, tri-, and quadrivalve specula are useful for exposing the cervix and vaginal vault (the latter according to the degree of their internal expansion), and certain parts of the vaginal walls. They permit the application of agents to the cervix, and the introduction of tampons into the vagina

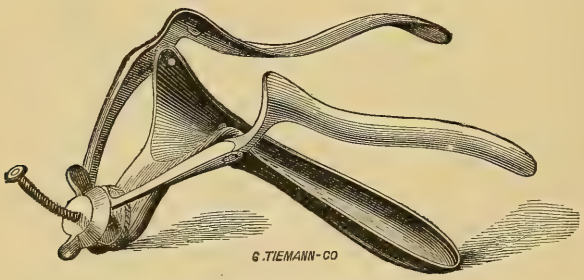


Fig. 35.—Nott's Speculum.

quite as well as the tubular specula, and for the introduction of substances (sound, applicator, bougies), into the cervical and uterine canal they are decidedly superior to the tubular, as they give more room and approximate the cervix to the vulva. But for the application of fluid or pulverized substances to the vaginal walls, and the leeching of the cervix, the valve instruments are inferior.

Introduction.—The valvular specula, like the tubular, may be introduced either in the dorsal or lateral position. The vulvar portion of the instrument is seized in the full right hand, and the rounded point of the closed blades pressed in their transverse diameter into the corresponding

antero-posterior vulvar cleft and under the pubic arch in precisely the same manner as described under the cylindrical specula. As soon as the tip has passed into the vagina, the speculum is turned with the screw and handle downward (if the patient be in the dorsal position), or backward (if she be on the side), and the speculum is pushed gently into the vagina until its hilt almost presses against the perineum. The screw is then turned down until the cervix appears in the lumen of the speculum or the branches are opened to their utmost, or the handles may be rapidly approximated and the screw not turned down until the cervix is caught. If the cervix does not at once appear in the lumen, the speculum should be slightly withdrawn and reintroduced, or its point be directed toward the spot where previous indagation has shown the cervix to be situated, and the branches then again separated. When thoroughly expanded, particularly in rather tense, contractile vaginal walls, a plurivalvular speculum is retained in place without assistance of the hand, a manifest advantage when it becomes necessary to draw the cervix into its lumen or steady it with a tenaculum before obtaining a good view of it or succeeding in introducing a sound, etc., into the uterine cavity. This retention is aided by elevating the pelvis on a cushion. There is usually no particular difficulty in exposing the cervix with a valvular speculum, unless the vaginal walls are so flabby that they drop before the cervix and hide it from view. If the instrument is introduced too far before being expanded its point may go behind or before the cervix, and the latter be pushed forward or backward when the blades are expanded, of course entirely removing it from view.

The introduction and expansion of the speculum, and exposure of the cervix, are quite as easy in the lateral as in the dorsal position. The plain lateral is preferable to the latero-abdominal for this purpose, since the mouth of the speculum does not dip so much, and any fluid which may have been introduced into the vagina is less likely to flow out accidentally and burn the vulva and external genitals.

Neither the tubular nor valvular specula are properly self-retaining. If the patient remains perfectly quiet and does not bring her abdominal muscles and intra-abdominal pressure to bear on the intra-pelvic organs, the speculum may be retained without the guarding hand of the physician. As a rule it is safer, if the physician has other use for both his hands, to ask the patient to place her fingers on the upper margin of the speculum and keep it in place. It is very awkward to have a speculum forced out by the, perhaps involuntary, movement or straining of the patient, and her clothes soiled by the agent which had been introduced into the tube.

In withdrawing the speculum care should be taken to do so gently and not to clap the blades forcibly together, as folds of vaginal wall or vulvar tissue are readily caught between them and bruised.

With the bivalve speculum only the vault and lateral walls of the vagina are exposed; with the trivalve also the anterior wall; with the quadrivalve, a portion of the posterior wall also can be seen.

The Univalve or Duck bill Speculum.—While the cylindrical and plurivalvular specula all act by separating the normally apposite walls of the vagina by mechanical force, the univalvular speculum secures the same result in an entirely different manner. It can attain this object only in a position of the patient in which intra-abdominal pressure is almost or entirely suspended; the function of the speculum is then, to a certain extent, merely to admit air into the vagina, when that canal becomes distended, and its walls and the cervix would be distinctly visible, did not the collapse of the soft vulvar folds, although admitting the air by a cleft, in a great measure obstruct the view. If that were not the case, the mere introduction of the finger into the vagina would do quite as well as the duck-bill; indeed, in some gaping vulvæ, as they are found in multiparæ, or women with lacerated perineum, the mere assumption of the semiprone or knee-chest position will expand the vagina and expose the cervix. Thus, in the absence of a speculum, the two fingers may be used in the semiprone position to retract the perineum and expand the vagina, often exposing the cervix, and proving useful for the introduction or removal of tampons.

The mere admittance of air, therefore, into the vagina does not suffice to give a clear view of its interior; the firm retraction of the perineum by the speculum, and the separation of the labia are necessary to admit light into the vagina. This purpose was accomplished by Sims, when, twenty-five years ago, he accidentally discovered the principle and from it devised his famous speculum; this speculum which, in its elegance, simplicity, and efficiency, has in all these years been found incapable of improvement. It is not necessary for me here to enter upon the circumstances which led to this discovery—a discovery which has revolutionized the whole practice of gynecology, and has made a science of what formerly was merely a profession. In my opinion, the Sims speculum is the only absolutely perfect speculum, and it seems to me that it would be preferable to give up the specialty rather than practise without it. Even now, aided as the practitioner is by all the improved methods of examination and diagnosis described in the modern text-books, he who neglects to examine a patient suffering from uterine disease with the Sims speculum labors under a disadvantage, and deprives his patient of one of the greatest discoveries in modern medical science. Only through the Sims speculum can the cervix be seen undisturbed and movable, with non-everted os and unimpeded circulation, and can the uterus be examined in its normal position unfettered by the enclosing and fixing branches of a speculum. The criticism which I have heard made on Sims' speculum by gynecologists of the old school, that its backward traction displaces the uterus and everts the external os, and that the result of every such examination is an abnormal one, is simply absurd, and can be refuted at any examination.

Fig. 36.—Sims' Speculum.

It is unfortunate that the proper use of the Sims speculum absolutely requires the assistance of a nurse or assistant to hold the instrument and elevate the superior buttock, for the general practitioner and young specialist is thereby ordinarily prevented from using it habitually in private practice. But this objection, commonly advanced against it, is no argument whatever against the value of the instrument. I found it, in former years, quite possible to do without a nurse and still use my Sims efficiently in ordinary examinations and applications, by the aid of the lateral and longitudinal tip-table described on page 30. Whenever both hands were required, I, of course, employed a nurse, as I now always do, for such a person certainly is a great convenience ; and, besides, her presence protects the physician against malicious accusations of attempted outrage, etc., which designing females occasionally make for purpose of blackmail.

As for operations on the cervix and vagina, suffice it to say that the duckbill of Sims has alone rendered them possible and successful. The

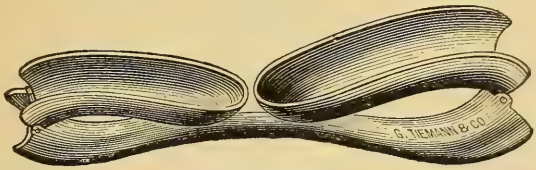


Fig. 37.—Dawson's Modification of Sims' Speculum (double-hinge), for Convenience of Transportation.

similar instrument of Simon, it is true, affords easy view of access to the vagina and cervix, but it is used in the dorso-gluteal position, the anterior and lateral walls being separated by flat hooks held by assistants (three), and therefore acts merely on the principle of mechanical expansion.

Practically there is only one Sims speculum of various sizes ; but several minor modifications have been given it, such as an increased curve of

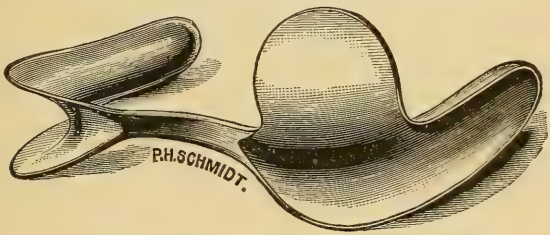


Fig. 38.—Mundé's Modified Sims to Support the Upper Buttock (P. F. M.).

the handle, or diminished angle of blades, whereby traction is facilitated ; or broader and shorter blades, so as to distend the posterior wall more and bring the cervix closer to the vulva for operations ; or the addition of a hinge at the angle of each blade and the handle, to facilitate the carrying of the instrument (Dawson) ; or the separation of the blade into two equal halves by means of a screw or bar, so as to expose the posterior wall of the vagina (Dawson) ; or the expansion of the upper edge of the blade into a flange, so as to support the upper buttock and prevent it from obstructing the view. The latter modification, which I truly think may be termed an

improvement, has of late been used almost exclusively by me when examining without a nurse, and has proved itself so efficient as to be, in my opinion, indispensable. The broad flange is moulded on to the ordinary Sims, and can be bent at will to any desired curve.

Of the ordinary shaped Sims (see Fig. 36), there are generally four sizes, two on each handle; besides a smaller speculum, also two sizes, for a virgin or very narrow vagina. The instruments are silver- or nickel-plated, and very durable, but require frequent replating.

Indispensable adjuvants to the Sims speculum are the depressor and tenaculum; the former to press forward the anterior vaginal wall and bring

Fig. 39.

Fig. 40.

Fig. 41.

Figs. 39, 40, 41.—Different Shapes of Tenacula.

the cervix into the axis of the canal, and the latter also to bring forward and steady the cervix. The depressors, of which cuts are here given, are the best. The tenacula represented in Figs. 40 and 41 have a somewhat

Fig. 42.—Solid Shank Tenaculum.

curved hook, and are less liable to slip or tear out than that seen in Fig. 39, the hook of which is at right angles. The latter is useful in operations in catching up sutures; but both varieties are frequently sold indis-

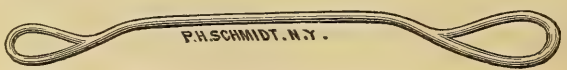


Fig. 43.—Sims' Double-end Depressor.

criminately, to the subsequent great annoyance of the operator. Where traction is desired, the curved tenaculum is the best; where the object is to approximate two surfaces, as the lips of a torn cervix, or the edges of

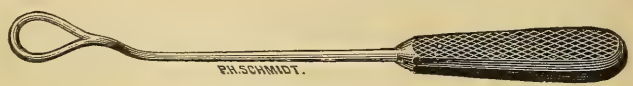


Fig. 44.—Sims' Depressor, with Handle.

any wound, the rectangular hooks are preferable. The tenacula made of one solid piece of steel, with simply a thin wood covering on the handle, are far preferable to those made of malleable iron fastened in a wooden handle, which are liable to bend under pressure. (See Fig. 42.)

Mode of Using the Duck-bill Speculum.—The patient occupies the latero-abdominal or semiprone position, usually the left (already described), on a flat table or couch, with her hips close to the left edge, and her head near the right upper corner of the table. She is covered with a sheet, only her vulva being exposed, and her clothes are well drawn back away from the sacrum in order not to interfere with the handle of the speculum; a

FIG. 45.—Position of Patient, Physician, and Nurse in Examination with Sims' Speculum (P. F. M.).

tightly laced corset or dress should be loosened. The lower buttock is covered by a napkin tucked in between the thighs and under the buttock, in order to prevent soiling the clothes. The physician sits behind the patient on a chair of convenient height, with the instruments to be used (speculum, depressor, tenaculum, sound, probe, and dressing-forceps in a basin of warm water on a chair or table at his right hand. The examining-table should be so placed and the physician so sit as to permit the best light to fall on the vulva. He takes the speculum from the basin, covers

the outside of the blade to be used with an emollient (soapsuds, vaseline, or simple water will do), places the index-finger of his right hand flat into the concavity of the blade to be introduced ; seizing the shank with the other fingers and thumb, and gently lifting the superior or right labium with the other hand (or the nurse may do this), introduces the point of the blade and finger with the concavity downward into the vaginal orifice. As soon as the finger and speculum are fairly in the vagina, the concavity of the instrument is turned forward, and the point backward toward the coccyx, and the blade, guided by the finger, along the posterior wall of the vagina, until its progress is arrested by the junction of blade and handle touching the perineum, that is, when the blade is completely within the vagina. The left hand of the operator then seizes the external blade firmly and makes steady traction, the line of traction not being directly backward, but slightly upward, so as to raise the upper buttock and admit more light. Having thus thoroughly retracted the perineum and admitted air and light into the vagina, perhaps having already exposed the cervix, the speculum is handed to the nurse, who, standing at the patient's sacrum, seizes the speculum in her right hand with the thumb in the concavity and the four fingers grasping the blade, and makes steady traction backward and upward, while the four fingers of her left hand draw the right buttock and labium gently upward. The direction of traction is a matter of great importance ; if the traction is made straight backward the light will not enter the vagina freely, even though the superior buttock is raised by the nurse, since the axis of the vagina will be downward ; as soon as the slight upward twist is given to the speculum the vaginal orifice points upward, and the depth of the vagina is at once illuminated. Further, it is important that traction should be so exercised that the point of the inner blade is neither directed too far back nor again drawn away from the posterior vaginal wall ; if too far backward, the cervix is drawn out of sight, and if too forward—that is, if the nurse draws too much toward the head of the patient—the speculum may be entirely pulled out of the vagina.

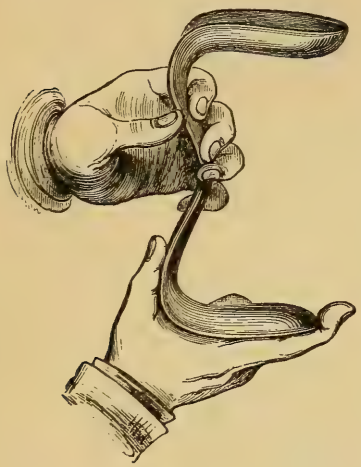


FIG. 46.—Manner of Holding and Introducing Sims' Speculum according to Sims.

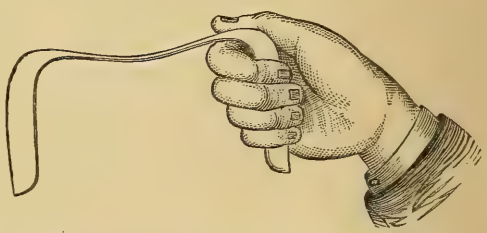


FIG. 47.—Manner of Holding and Introducing Sims' Speculum, Modified (P. F. M.).

I have found it useful in rapidly exposing the cervix, particularly if it is situated far back in the sacral excavation, first to employ the straight backward traction, as described, until the vagina expands, and then tilt the inner point of the speculum slightly forward; by this maneuvre the cervix is, as it were, lifted out of the hollow of the sacrum and fully exposed.

The expert can dispense with the guiding finger in introducing the speculum, and seizing the external blade in his right hand, and lifting the right labium with his left, may gently slip the blade into the vagina and behind the cervix, closely hugging the posterior wall. The beginner is liable to pass the blade too far forward in front of the cervix, which then, of course, when traction is made, is drawn backward out of sight, greatly to the astonishment of the examiner, who cannot imagine why he cannot find the cervix.

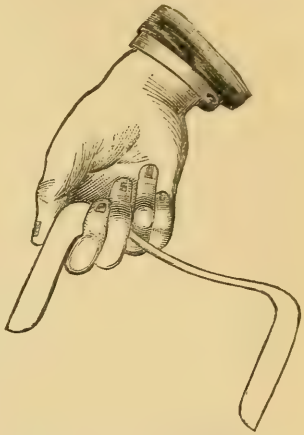


FIG. 48.—Manner of Holding Sims' Speculum for Introduction without Guidance of Finger of Right Hand (P. F. M.).

By grasping the speculum as above directed, resting the right forearm on her right hip, and drawing steadily backward in a direction corresponding to a line running from the patient's left pubic bone to her right tuber ischii (see Fig. 5), the trained nurse can stand erect and bear this position for a length of time entirely impossible for an inexperienced person. It is important both for the convenience of the operator and the comfort of the patient that traction be steady and the speculum be shifted by the cramped or tired fingers of the nurse as little as possible. Steady traction, while at first somewhat painful (and it is this traction on the perineum which causes the real and only pain complained of during an examination with Sims' speculum), is soon borne without a murmur, while frequent shifting of the instrument always causes fresh pain. Pain may also be caused by allowing the lower, rather sharp edge of the blade to rest heavily against the lower labium, as is the case when traction is not made in the prescribed direction.

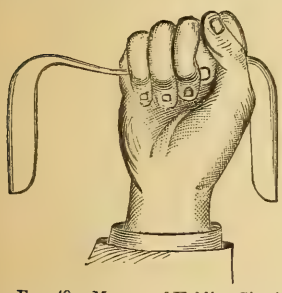


FIG. 49.—Manner of Holding Sims' Speculum according to Sims and Emmet.

This question of traction and holding the speculum is exceedingly simple to the expert, but full of difficulty to the beginner. A nurse untrained in this particular is a source of annoyance and positive disturbance to the operator. It is obvious that, in order to give the nurse the proper directions, the physician should himself know how to use the speculum. For this reason I have been rather prolix, perhaps, in the above description. The necessity for such minute detail has frequently been illustrated to me in my private classes, when gentlemen (often older practitioners)

could not succeed in exposing the cervix, simply because they made straight backward traction, and drew too much on the point of the inner blade. A mere upward twist of the blade and forward tilting of its point would at once bring the cervix forward and in full view.

As a rule, I follow the plan of first thoroughly exposing the cervix and vagina myself by the speculum in the left and the depressor in the right hand, the nurse merely drawing up the right labium, and do not hand the speculum to the nurse until I have it exactly where I want her to keep it; any subsequent shifting is to be done by myself.

The above method of holding the speculum is the one I have always practised and taught, and in my experience it has proved perfectly satisfactory; indeed, I myself have repeatedly, in assisting friends at operations for laceration of the cervix, held the speculum in this way for nearly an hour without becoming tired. But Dr. Emmet in his recent work describes a somewhat different method, which to me certainly does not appear as comfortable as the one I employ. After speaking of "traction on the perineum" with the speculum, he says: "By placing the buttocks close to the angle of the table, the assistant is enabled to stand sufficiently behind the patient to steady the instrument. This is not done by traction, but by using the width of the hand like a wedge between the buttock and upper edge of the speculum. The central portion or isthmus of the instrument lies against the flat of the hand, and the upper part between the thumb and index-finger, so that the fingers are free, and can be moved without disturbing the position of the speculum. By thus using the hand as a wedge, the instrument can be steadily held in place for hours, during a long operation, without cramping the fingers. It promotes greatly the comfort of the patient to have the instrument held in this manner, and enables her to relax her muscles, which she cannot do if the perineum and rectum are irritated by the frequent jerking which occurs when traction is made by the fingers alone, without a resting-place for the hand, as I have described."

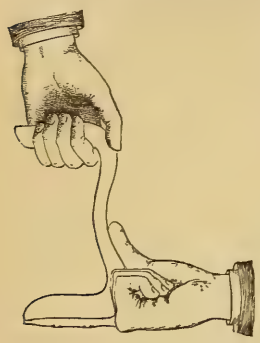


FIG. 50.—Manner of Holding and Introducing Sims' Speculum, modified (P. F. M.).

When I speak of traction, I mean, of course, a *steady*, uninterrupted retention of the speculum in the position in which it was handed to the nurse after the cervix was exposed, not a forcible, spasmodic pulling at the speculum. It is true, the operator exerts the traction on the perineum before he hands the instrument to the nurse, who keeps the perineum in that condition of retraction, but, after all, what is it but "traction" which keeps the perineum back?

Emmet follows Sims in this method of holding the speculum, and, therefore, it may appear presumptuous to modify the inventor's own directions. But I have found my plan serve me admirably, and if the arm is rested against the side and hip, much less fatiguing than the full grasp recommended by Sims and Emmet.

This matter must naturally be a question of habit and practice, and, doubtless, both plans answer equally well in the hands of the expert.

The nurse having taken charge of the speculum, the operator takes the depressor in his right hand, and with it presses the anterior wall of the vagina forward, thereby drawing the cervix still farther into the vaginal axis. If necessary, even then, to attract or fix the cervix, its anterior lip is seized by a tenaculum, which is hooked into the cervical mucous

FIG. 51.—Incorrect Position of Patient for Examination with Sims' Speculum (Halliday Croom, Leblond). Illustrating necessity for detailed description of the position.

membrane from within outward, and by which the os may be opened, and the whole uterus drawn down.

If the physician is obliged to examine his patient without the assistance of a nurse, his left hand is used to separate the labia, and then seizes the speculum, and gives it the utmost upward twist possible, while the right hand sharply presses forward the anterior vaginal wall with the depressor. By bowing the head, the eye may generally succeed in reaching the cervix, and getting a fair glimpse of it. The overhanging of the superior buttock, however, usually interferes with vision ; and to obviate this, the flanged speculum shown in Fig. 38, should prove useful. If the patient lies very thoroughly on her side and, particularly, if the table has the longitudinal and lateral tip described on page 30, the expansion of the vagina will often be sufficient to enable the physician unaided to obtain a good view of the parts, and, dispensing with depressor or tenaculum, introduce the probe, or sound, or applicator. The introduction of vaginal tampons, and the application of tincture of iodine or other agents to the vagina and cervix, is thus perfectly feasible.

FIG. 52.—Correct Position for Examination with Sims' Speculum (P. F. M.).

The whole vagina, except the posterior wall, and the cervix in its totality are exposed freely to view through Sims' speculum, an advantage offered by no other form of speculum, and not to be undervalued. The cervix, being visible in its whole periphery, it is much easier to recognize deformities and injuries of that organ through this speculum than through any other. Thus, for

instance, laceration of the cervix is easily recognized, and its extent and curability determined only through this instrument. This is done by seizing each lip with a tenaculum from its vaginal surface and approximating them, when the everted cervical mucosa will be rolled in, and the normal shape of the cervix be restored; if the lips cannot be approximated, either lateral adhesions or, what is more common, cystic and areolar hyperplasia of the cervix are present. Thus, a laceration can readily be distinguished from an erosion of the cervix, in which latter there are obviously no torn lips to approximate. It is often possible by thoroughly separating the vaginal walls with speculum and tenaculum to obtain a view of a good portion of the cervical canal, especially if the cervix be lacerated.

The duck-bill speculum may be used with equal facility in the right semiprone position, the directions for its employment, so far as the hands are concerned, merely being changed from left to right, or the reverse. In

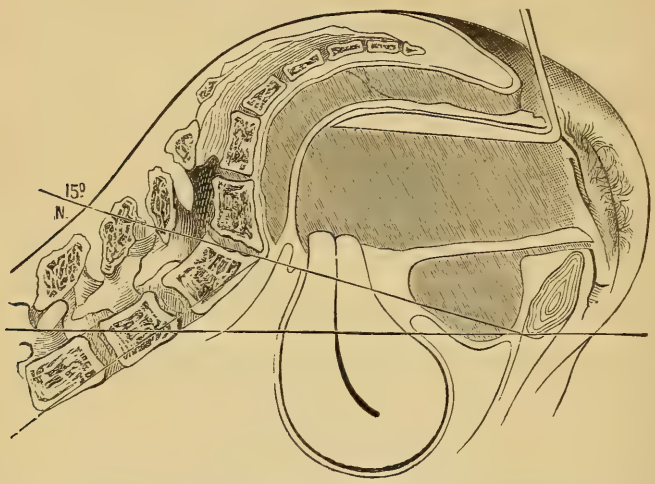


FIG. 53.—Expansion of Vagina. Position of the Uterus and Speculum in the Knee-chest Position (Hegar and Kaltenbach).

cases where it is desirable to see or reach the right upper portion of the vagina, as in fistulæ in that region, or the aspiration of cellulitic abscesses in the right broad ligament, this position is preferable to the left.

In the knee-chest position, the Sims speculum is also a very useful instrument. By lifting the perineum with it, air and light are admitted into the vagina, which is distended balloon-like, every fold and crevice becoming effaced. A better view of vagina and cervix are obtained in this manner than even in the semiprone position; the objection to the knee-chest position is its inconvenience to the patient, and consequent unsuitableness for long examinations. The speculum is simply slipped into the vagina sideways, turned, and its shank grasped by one full hand, which makes strong upward traction, while the forearm rests on the sacrum as a fulcrum. Depressor and tenaculum are generally not needed to expose the

cervix. In stout women it is usually necessary to separate the nates before obtaining a full view. An examination in this position may be advisable when it is desired to obtain a view of the distended vagina (fistula, vaginitis); it is chiefly employed as a preparatory step to replacing a retrodisplaced uterus (see chapter on Replacement of the Uterus), or introducing a pessary, or operating on a vesico-vaginal fistula.

In case of emergency the first two fingers of the right hand may be used as a substitute for the duck-bill speculum, and a view of vagina and cervix be obtained, or tampons introduced or removed by their aid in semiprone and knee-chest positions.

The difficulties encountered in making a specular examination are chiefly such as are due to the presence of the hymen, or constriction, or rigidity of the vaginal orifice and perineum, or sensitiveness and soreness of the parts. The obstacle caused by these conditions may be overcome by great gentleness and persuasion, the use of a very small speculum, and previous careful anointing of the vaginal orifice; in aggravated cases, anesthesia may be required. When the resistance is due to vaginismus, or erosion of the vulvo-vaginal orifice, the repeated application of a solution of nitrate of silver (grs. xv. to xxx. to the ounce), or of iodoform or belladonna ointment or suppositories, will generally toughen the parts so as to permit the examination. A very common obstacle to a clear view of the interior of the vagina is the forcible contraction by the patient of the perineo-vaginal muscles, and the pressing down of the anterior vaginal wall. Gentleness and persuasion will soon overcome this. In stout women a broader and shorter speculum is required to expand the vagina thoroughly and bring the cervix nearer the orifice. If the vaginal walls are very flabby and foldy, some difficulty may be experienced in preventing them from obstructing the view of the cervix; a short, broad speculum, a large depressor, and downward traction with the tenaculum will generally overcome this. If necessary the examination may be made in the knee-chest position, and will then always be successful.

Modifications and Combinations of the Sims Speculum.—Besides the minor modifications referred to on page 83, numerous other contrivances have been adapted to Sims' speculum, all with the view of supplying the place of an assistant. Of these the most simple is that of Thomas, the attached sliding depressor of which is intended to free the right hand; but I have found the breadth of the blade at the angle, and the shank holding the depressor, entirely insufficient to prevent the overlapping of the superior natis, and the view therefore quite as much obstructed as with the plain Sims and no assistant. The only advantage of this instrument is the attached depressor. In spare women, with tense vulva and vagina, it will often be found serviceable.

Greatly more pretentious are those modifications which seek to do away entirely with an assistant and also give the physician the use of both hands. Numerous devices of this nature have been published, and others, to my knowledge, have not as yet been laid before the profession. Perhaps the most serviceable self-retaining specula are those of Emmet, Hun-

ter, Erich, and Studley, the construction and application of which is quite complicated, and should be studied in the original. The mechanism of the majority of these specula consists essentially in using the broad posterior surface of the sacrum as a fulcrum from which the fixation and retraction of the blade is secured. Emmet's, Erich's, and Studley's specula I have tried and found decidedly useful. The objection to all these contrivances, however, it seemed to me, was the impossibility of securing the upward twist of the blade so strongly insisted upon in my description of

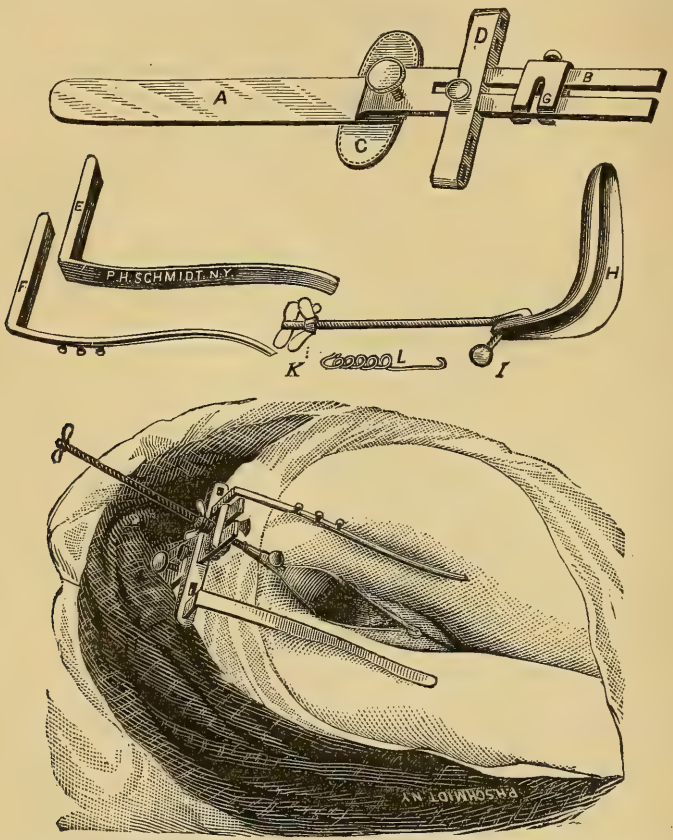


FIG. 54.—Studley's Modified Sims' Speculum. *A*, spinal plate; *B*, sacral plate; *C*, cross-bar; *D*, sliding-bar; *E*, *F*, gluteal bars; *G*, slotted cap; *H*, speculum; *I*, screw by which point of speculum is varied anteriorly or posteriorly; *K*, screw by which the perineum is retracted; *L*, eyeleted wire hook for varying position of speculum laterally.

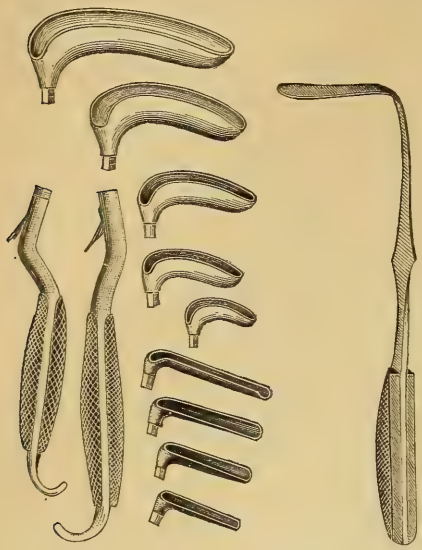
the examination with the Sims, which twist is so essential to the proper illumination of the vagina. The point is, that the hand which lifts the superior natis and labium cannot be dispensed with. Another objection is the preparation required to adjust these instruments, which may alarm the patient.

There are but two combinations of Sims and another speculum, so far as I know, and they are by Dr. Gillette, of New York, and myself. In both of these instrument a Sims is combined with a Nott speculum, and

both are designed to be used in the semiprone position only when combined, and in the dorsal or lateral when the detached Nott is employed. The advantages of Dr. Gillette's instrument are the shortness of the shank of the Nott, when detached, and the curve (Van Buren's) of the other blade, which renders it serviceable for rectal examination. The advantage of my instrument, on the other hand, is the ability to enlarge the antero-posterior expansion of its vulvar orifice by sliding forward the anterior branches (the ant. post. diameter of the orifice then measures three to two inches unenlarged, the transverse diameter two inches), an advantage not to be undervalued, as it not only gives more room but fixes the whole instrument more firmly in the vagina. In both instruments the Nott is detachable, and the screws and anterior branches can be removed so as to form a plain Sims. We thus have a combined Sims and Nott, a simple Nott and a simple Sims in one instrument. I can testify to the utility and simplicity of my instrument, having even frequently found it to rest so firmly on the inferior buttock when fully expanded as to enable me to loosen my hold on the handle and use both hands for manipulation. The objection to these instruments is the pain which the enormous distention of the vaginal pouch causes (three and a half inches at tip of blades of my speculum) ; but this objection is overcome by not separating the blades to their limit. An instrument similar in design has also been devised by Dr. Jenks, of Chicago. It is natural that every inventor should be prejudiced in favor of his own instrument and that, indeed, he should succeed better with it than any one else. Being myself guilty of a speculum (for mine was devised independently and before I knew of Dr. Gillette's) it will not seem invidious in me when I say that all these complicated modified Sims specula have not succeeded in becoming popular, and are chiefly used by their inventors. That this is not a proof of their worthlessness, I am firmly convinced. For my part, if I should not succeed in exposing the vagina and cervix, as I wish, and using whatever manipulations are necessary through Thomas' or my combination speculum, I should think it useless to try one of the first described complicated contrivances, and at once secure competent assistance.

Other Forms of Specula.—I shall describe but two other specula, which come under none of the exact heads already mentioned, viz. : Neugebauer's double-crescent speculum as modified by Barnes, and Simon's gutter-speculum with vaginal holders. For some years past I have had less and less occasion to use either the valvular or combination Sims specula, finding the ordinary Sims, or the one with a buttock-flange devised by me, all-sufficient. Neugebauer's double crescent speculum (or double shoe-horn speculum, as it might be called), can be used either on the back or in the lateral position, the posterior blade being introduced first and the anterior slipped into it. Both hands are required to hold the blades, which will do for diagnosis, but renders the instrument unsuitable for operations unless an assistant be present to hold one blade. What its advantage over Sims' speculum is does not appear to me, and I do not see in what it surpasses our best large-mouthed bivalves. The necessity for its invention therefore

seems doubtful, and I question whether more than two or three gynecologists in this country use it. However, as a bivalve, which it really is, I can conceive of its being useful in many cases, chiefly where very great distention of the cul-de-sac is desired, or (it comes in sets of single blades, from one to four, each blade having a different size at either end) when the vaginal orifice is very narrow and only one blade can be introduced at a time. An objection must always be the immobility of the cervix. Barnes speaks highly of it. I have never used it, nor felt the want of it.



FIGS. 55 and 56.—Simon's Vaginal and Specula Retractor.

The construction and mode of employment of Simon's specula and holders is shown in the accompanying diagrams. The specula and plates for supporting the anterior wall come in sets of five different sizes, which are attached to the handles; the flat holders with long handles are used to retract the lateral walls of the vagina. The patient occupies the gluteo-dorsal posi-

FIG. 57.—Position for and Manner of Using Simon's Specula.

tion, one assistant holds the perineal speculum, another the left leg and the anterior plate, and the left lateral retractor; a third assistant

the other leg and the right lateral retractor. An excellent view is thus obtained of the cervix and vaginal pouch, particularly of the anterior wall. This position enabled Simon to attain his marvellous results in operating on large vesico-vaginal fistulæ, and to cure many cases of prolapsus uteri by his posterior colporrhaphy operation. But it is manifestly much less convenient than the Sims position for the assistants, more of whom are required, and the number of instruments needed is also greater; and I can conceive of no operations on cervix or vagina which can be performed more easily through the Simon specula than through the Sims, except only those on the posterior wall of the vagina, in which Simon's method is indispensable. Therefore, the Simon instruments and position have not become popular in this country for cervix or fistula operations.

A very ingenious and practical contrivance has been devised by Fritsch, of Breslau, for supporting and steadying the separated legs of the patient, and retaining the modified Simon's specula, in operations on the cervix. But I fail to see the necessity for such assistant-saving devices in any community short of a deserted island. As a rule, wherever such operations are to be performed, sufficient assistance can readily be obtained free of expense, and trained gynecologists are by no means essential to hold a speculum or squeeze a sponge.

C. *Examination of the Uterus with Sound and Probe.*

There are two varieties of uterine sounds, the flexible and the inflexible.

The flexible are made of whalebone or rubber (elastic), or silver or copper; if the latter, generally silver- or nickel-plated. Of these flexible metal sounds there are again two kinds: 1, Such as are so flexible as to bend at the slightest obstacle and yield to the pressure caused by an attempt to replace a displaced uterus; and 2, such as are stiff, but can be moulded by the finger, and retain the shape and curve given them despite any ordinary obstacle encountered, such as a sharp flexion, and permit the reposi-

FIG. 58.—Simpson's Stiff Sound.

tion of a non-adherent uterus without straightening out. The representative of the former class is the Sims, that of the latter the Simpson sound.

Of these two, I prefer and always use the stiffly flexible Simpson sound, because it is thicker than the Sims and therefore less likely to catch in the folds of the cervical mucous membrane, but chiefly because a flexible sound of soft metal is difficult to introduce and, yielding to every obstacle and following every curve of the uterine canal, gives but little information as to the direction of the canal and the mobility of the uterus; that is to say, when it is introduced by the touch only, which is the manner in which I generally use the sound; if through a Sims' specu-

lum, the highly flexible sound or probe is preferable and safer. The precautions always to be observed in using the stiff sound will, I think, justify my preference for it. The Simpson sound is graduated in quarter inches and inches for the whole length of its shaft, and has a small knob at a distance of two and a half inches from the point, this being the average length of the normal uterine cavity; the uterine portion of the sound is

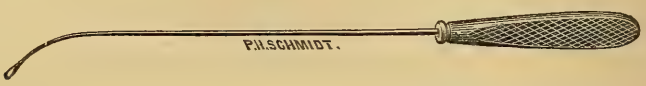


Fig. 59.—Sims' Flexible Sound.

not graduated in order to be perfectly smooth. The point is blunt and slightly expanded.

Another thicker sound of uniform size all through has been devised by Peaslee, who used it to dilate and preserve patulous the uterine canal. It is also graduated, and is very useful besides, in replacing a dislocated uterus, as its thick tip is less likely to injure the fundus.

Very thin, flexible, or elastic rods made of pure silver, whalebone, or hard rubber, are called probes, and are used for precisely what their name implies. While a sound carries a more sonorous tone and purpose with

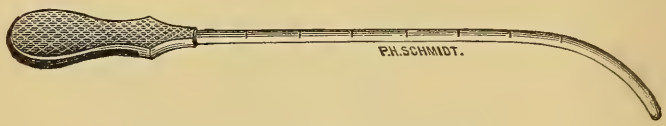


Fig. 60.—Peaslee's Thick Sound.

it, the probe is simply meant to wind its way into the uterine cavity and gently ascertain the direction of the canal and its length.

The probe ordinarily in use is that of Sims or Emmet; it is so flexible that it is almost impossible to introduce it into the uterine cavity without a speculum, and it bends at the slightest impediment in the canal. It is of the thickness of an ordinary mandrin of an elastic catheter, and provided with a small knob at the tip. The whalebone or hard-rubber probes are similar in size and shape, and elastic instead of flexible. Probes are not graduated. All probes are to be used through a speculum,

Fig. 61.—Sims-Emmet's Flexible Silver Probe.

always preferably the duck-bill. The regulation length of sounds and probes is one foot from tip to tip, but some elastic sounds are made longer for use in cases of elongation of the uterine cavity, as in fibroids of the uterus.

A flat whalebone sound with a broad knob at the tip, and a long hard-rubber probe, both attached to a handle, have been devised by Dr. Thomas, for the diagnosis of the existence and attachment of submucous uterine fibroids. These sounds adapt themselves to the narrow space

between the projecting tumor and the opposite uterine wall, and by the direction which they take give the examiner an idea of the presence and extent of the tumor.

A jointed spiral sound has been invented by Dr. E. W. Jenks, of Chicago, for use in tortuous uterine canals (fibroids, etc.). It is hollow, and may also be used as a catheter.

Indications and Precautions for the Use of the Sound.

The indications for using the sound or probe may be summed up in the following sentence: *Whenever any information is to be obtained, and a previous careful oral and bimanual examination reveals no counterindication, particularly if it be a first examination, the sound may be passed into the uterus.* The chief indication, therefore, is the chance of ascertaining something which may be necessary or valuable for the physician to know. This chance will, of course, present itself most frequently in patients whom we have not seen before, and of whose local condition we are totally ignorant. Besides, it seems to me that the same reason enunciated as an indication for a specular examination, applies equally to the introduction of the sound, viz., that it is our duty to employ every means at our command to obtain a thorough knowledge of the patient's condition, *provided always that such means are not likely to be injurious.* Acting on this principle and carefully selecting my cases and eliminating those in whom the least counterindication, or suspicion of one (to be stated hereafter) existed, I have been in the habit since the beginning of my gynecological practice, fully sixteen years ago, of exploring the cavity of the uterus with the sound or probe in every patient who came to me for a first consultation. I have thus introduced the sound in at least fifteen thousand cases, besides certainly as many more times in women upon whom it was passed repeatedly either for diagnosis or for practice, and have for the last ten years taught my private students to introduce it as soon as they had acquired sufficient dexterity—and in all these cases I have still to meet with the first case in which inflammatory reaction followed the sounding, or anything more than slight uterine colic or moderate shock resulted from it. While temporary, suprapubic pain was not unfrequent, uterine colic was rare, and I have met with but two cases in which colic and shock lasting several days ensued, and in both of these cases the patient confessed afterward that the sound had been used once before by other physicians—as it happened, expert gynecologists—with the like result. In no instance but these two have I had occasion to regret its use—except, I confess, several cases of *very* early pregnancy in which this routine sounding induced miscarriage. Thus, I once sounded a lady at her first visit who had menstruated exactly three weeks previously, and found no obstacle to the sound; to be sure, the uterus measured three and a quarter inches, but her youngest child was but five months old. Still, as events proved, the lady was two to three weeks pregnant at the time of sounding, began to flow gently several days later, and miscarried

in about a month, the ovum presenting the appearance natural to six weeks. In several cases intentional misstatement was made as to the date of the last menstruation. But, on the other hand, I have repeatedly known the pregnancy to go on after a sounding unwittingly performed. Notwithstanding this occasional tolerance, I should deprecate most emphatically the practice recently proposed by a Western gynecologist to diagnose early pregnancy by the elastic resistance offered to the point of the sound as it is passed toward the fundus.

I am aware that in thus counselling the frequent introduction of the sound I am advising a course different from that usually recommended. Since the introduction of the sound by Simpson, who was, of course, its earnest advocate, there have been frequent controversies as to the utility and dangers of the instrument. The majority of modern gynecologists advise its rational, careful employment, and hold that the present development of the methods of bimanual examination render the sound much less necessary than formerly. That is precisely what I also believe and practice. USE IT ONLY WHEN NECESSARY AND DEVOID OF DANGER; *and it is precisely during a first examination that I claim for it the reason of necessity and utility.* I wish it distinctly understood that I do not advise its use in every case, even though it probably may do no harm; that I carefully exclude, so far as possible, all counterindicating circumstances and conditions; further, that I should permit its use in the cases described by me only by persons experienced in its manipulation, and should forbid it to all such who either are not experts in indagation and bimanual examination or are novices with the sound. With these restrictions I think its frequent employment in the cases mentioned, and after the manner to be described by me, both justifiable and useful. I need scarcely say that the greatest care and delicacy are indispensable features of its introduction. The familiarity with the physical examination of the female sexual organs and the previous knowledge of the position of the uterus and the direction of its canal, which I thus make *indispensable conditions* for the use of the sound, will naturally restrict its use to those gentlemen whose touch has been sufficiently educated to enable them to practise gynecology intelligently. All others should either avoid the specialty or hasten to improve their acquaintance with its rudiments. It was for the purpose of fitting gentlemen to use the sound in cases where it alone may settle the diagnosis that I for years ran the risk necessarily attending its use for practice by inexperienced hands in my private classes.

The *precautions* to be observed in using the uterine sound or probe are chiefly comprised in the two words: dexterity and gentleness. No force whatever should be used either in slipping the sound into the uterine cavity, or in manipulating or rotating it while there. As a rule, the introduction should give pain only when the tip passes through the always narrower internal os or touches the usually tender fundus. Neither should it be followed by a show of blood, except, perhaps, when it is necessary to work the point through the internal os, or the endometrium is hyperemic. If an obstruction is met with at any point of the canal,

particularly at the os internum, which the gentle manipulations of a practised hand cannot overcome, the attempt should be abandoned; at least, if persisted in, it should not be considered a simple diagnostic measure. If severe pain is caused, if the patient shows signs of faintness or collapse, the sound should be at once withdrawn, and, if necessary, the proper restoratives administered. A precaution especially to be observed is to pass the sound forward very carefully after its tip has passed the internal os, in order, first, not to give pain by striking sharply against the fundus, and, second, not to risk perforating the uterine wall. It must not be thought, because the tissue of the uterus is ordinarily tough and its closely interlaced fibres possess great power of resistance, that this accident is impossible. There are certain conditions of the uterus in which the organ has retained the soft, pulpy texture of the puerperal state, is in fact subinvoluted, or in which such a change arises independently of parturition, so-called marciditas uteri, in which the sound has been known to perforate the fundus with the greatest facility, even in experienced hands, and appear at the umbilicus, to the horror of the operator. That such accidents have thus far, strange to say, been followed by no evil consequences, should scarcely lead us to neglect every possible precaution to avoid them.

FIG. 62.—Fibroid in Anterior Wall of Uterus Simulating Anteflexion (P. F. M.).

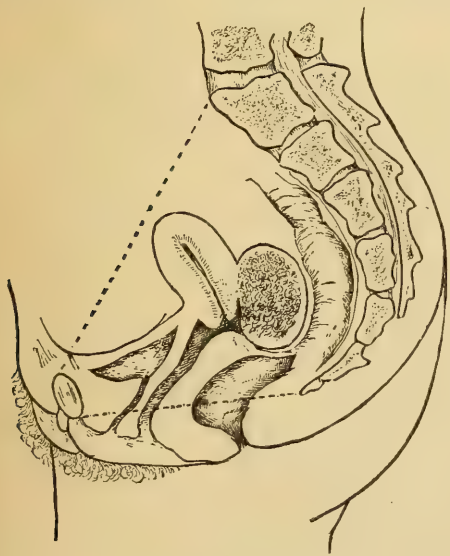


FIG. 63.—Fibroid in Posterior Wall of Uterus Simulating Retroflexion (P. F. M.).

As a rule, it is not advisable, because more or less painful and hazardous, to move the uterus about with the sound, the fulcrum for which is the mucous membrane of the fundus. This

maneuvre is often employed, particularly in replacing a dislocated uterus, or in producing the opposite displacement; but a certain amount of risk always accompanies it, and it is not to be recommended for general employment. In experienced hands, however, fully competent to gauge the amount of force which the average fundus uteri will stand without injury, the sound may under certain circumstances (to be hereafter described) be employed as a repositor.

In patients who are still suffering or have recently suffered from uterine hemorrhage, the passage of the sound or probe may be indicated with a view to ascertaining the length and dimensions of the uterine cavity and the possible presence of an intra-uterine tumor (submucous fibroid or polypus) as the cause of the flow; but unusual care should be exercised in order not to renew or increase the hemorrhage.

In chronic pelvic peritonitis or cellulitis of the adhesive type, it may occasionally be permissible to introduce the sound, but only when the uterine canal is patulous and straight and the sound glides in without the least effort.

The *information* to be obtained by the introduction of the sound or probe is the following: the patency of the external os, the dimensions of the cervical canal, the size of the internal os, the dimensions of the cavity of the body of the uterus, therefore the dimensions of the whole uterine canal. Further, the sensitiveness of the internal os and fundus uteri; the direction and course of the uterine canal, and consequently the position of the body and fundus of the uterus. Further, the mobility of the uterus, and consequently the presence or absence of adhesions and obscure remains of pelvic peritonitis or cellulitis. Further, the existence of endotrachelitis or endometritis by the character of the discharge, if any, issuing from the external os and attached to the finger or sound on their withdrawal from the vagina. The opening of the external and internal os, possibly the straightening of the canal in flexions, by the sound may thus give exit to retained secretion.

The presence of an intra-uterine growth may be detected by one or the other variety of sounds or probes. The occurrence of actual hemorrhage after the gentle, easy introduction of the sound may indicate an inflamed or congested condition of the endometrium, or the presence of granulations or vegetations, or of a tumor; in conjunction with other pelvic symptoms (lancinating pain, cachexia), perhaps, uterine sarcoma. A few drops of blood very commonly follow even careful sounding and have no practical significance. A rather free bleeding may denote a hyperemic condition of the endometrium, or a chronic endometritis. A tortuous course of the uterine canal is best detected by a flexible probe.

It should be distinctly understood that the sound is NEVER to be introduced until a careful vaginal and bimanual examination has preceded it, upon the results of which the advisability or necessity for the sound must depend. Also, that the position of the uterus should have been previously ascertained by indagation, and the sound is to be relied upon for this purpose only in the complications presently to be mentioned. He who uses the

sound to detect the position of the fundus uteri without first having failed to find it by bimanual examination, has entirely mistaken the scope of the instrument or is ignorant of palpation.

Aside from those cases where the introduction of the sound may prove of possible utility, there are numerous instances in which it alone can reveal the whereabouts of the body of the uterus and settle the diagnosis. Such are all cases in which the condition of the abdominal wall prevents effectual bimanual examination, as when the presence of an ante- or a retrocervical tumor simulates an ante- or a retroflexion, and the situation of the fundus cannot be detected through the abdominal wall; the sound then shows, by its forward or backward or straight direction, whether the case is one of ante-uterine tumor or anteflexion (see Figs. 17 and 62), or of retro-uterine tumor or retroflexion (see Figs. 20 and 63). Further, in large abdominal tumors the sound usually settles (there are exceptions to this rule) the diagnosis between ovarian tumors, in which the uterine canal is seldom elongated, and the fibro-cysts of the uterus, in which the uterine cavity may attain the length of seven or eight inches.

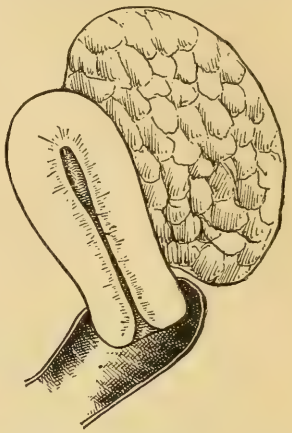


FIG. 64.—Showing Normal Length of Uterine Cavity in Ovarian Tumor (P. F. M.).

Counterindications and Dangers.—There are two conditions which absolutely counterindicate the introduction of the sound or probe, and these are: 1, A suspicion of pregnancy, *i.e.*, the missing of a menstrual period or some other prominent sign; and 2, the presence of acute, subacute, or even chronic inflammation of the pelvic cellular tissue or peritoneum, and acute inflammation of the uterus. If a patient reports having missed a period, even if she be but a few days beyond the time, beware of introducing the sound. Even with this precaution, as already related, an accident may occur, for which certainly the physician is not to blame if the sounding took place before the time of the expected period. Patients will often misinform the physician as to the date of their last period, for the precise purpose of inducing him to do something which may bring about a miscarriage; the previous bimanual examination should have shown the size of the uterus, and led the physician to suspect pregnancy. But it should be stated in justification of the not altogether unknown accidental production of abortion by experts as well as non-specialists that the diagnosis of early pregnancy, from six to ten weeks, may be, and at the first-named period always is, a question of

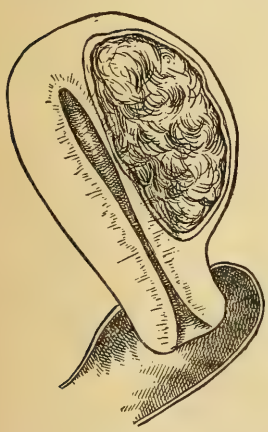


FIG. 65.—Showing Elongation of Uterine Cavity in Interstitial Fibroid (P. F. M.).

great difficulty or impossibility, requiring the most delicate and practised touch. In areolar hyperplasia a slight enlargement, corresponding to a five to seven weeks' pregnancy, may be almost imperceptible, and if the abdominal walls are thick or rigid, or the uterus slightly retroverted, it is generally impossible to grasp the body of the uterus between the fingers and accurately determine its outline. The overlooking of pregnancy up to eight weeks, and the accidental production of abortion by sounding may, therefore, in the exceptional cases mentioned, be excusable, and has probably happened once or oftener to every experienced gynecologist. But it is excusable only when all the proper means of avoiding such a mistake have been employed. I have already stated that the introduction of the sound for the diagnosis of pregnancy (the diagnosis being made by the arrest of the sound by a soft elastic body before entering its normal distance) is entirely reprehensible. Besides, a diagnosis cannot surely be made in this manner, as the sound is quite as likely to slip between uterine wall and membranes to a depth even greater than normal, as to be arrested at the internal os by the ovisac.

A probe will naturally, by its small size and flexibility, produce less irritation than a sound, but it should be equally tabooed in the cases named.

The other counterindication, uterine or pelvic inflammation, must have been detected by the finger, and is quite as absolute as suspected pregnancy. Only in very old cases of cellulitis or peritonitis, in which indurations and contractures in the pelvic cellular tissue are the sole signs of the long distant inflammation, in which, in fact, those residues have taken on a fibrous or cicatricial character, may the cautious introduction of the sound and chiefly of the probe be justifiable ; such a course may be necessary when it is important to decide between a retro-uterine tumor (adherent fibroid, or ovary, or cellulitis) ; and an adherent retroflexed fundus uteri. Old "chronic metritis," so-called, subinvolution or areolar hyperplasia, and chronic or subacute endometritis, do not of course counterindicate the sound.

The *dangers* attending the introduction of the sound are, the production of uterine colic or actual collapse from shock—a temporary affair—and of inflammatory reaction in the serous or cellular tissue of the pelvis. Uterine colic is not a very uncommon result, and generally lasts but a few hours or less, and passes away without further injury. Collapse from shock is rare ; I have never met with it from sounding, but several times from a medicated application to the endometrium. A fatal case of shock from sounding is not known to me. It must be remembered that every gynecological manipulation is attended with a certain amount of risk and danger ; even a simple digital examination has been followed by septicemia originating from a scratch of the cervix by the nail, and a severe peritonitis has resulted from the gentle compression of the peritoneum exercised during a bimanual examination. But such accidents are the rare exception, and if we were to avoid *every* interference with the female sexual organs because an accident *may* possibly happen, we should simply have to

give up the local treatment of those organs entirely. Knowing the possibility of such an unexpected accident, we should forestall all reproach by employing the greatest care and delicacy.

A pelvic peritonitis or cellulitis *may* follow any sounding, as it may any intra-uterine application, or even a cauterization of the cervix. Therefore it is always wise, after having for the first time sounded a patient whose peculiarities you are not familiar with, to advise her to remain quiet for several hours after or even for the whole day, until all probability of reaction has disappeared. Indeed, it is advisable, after every sounding or intra-uterine application, even in old patients, to direct them to remain in the anteroom for some time, one-half or one hour, before leaving, and I have in several instances been called to restore ladies from temporary faintness following applications. Such attacks are not always purely physical in origin, but frequently arise from a hysterical tendency. Thus I have seen patients go almost into a convulsion, or break out into a fit of weeping, on the passage of the sound through the internal os, symptoms which subsided as soon as the sound was withdrawn and were followed by no reaction whatever, thus showing their purely nervous nature. I have already stated, under Precautions, that the fundus uteri has repeatedly been perforated by the sound in experienced hands, the uterine tissue in these cases being unusually tender; also, that ordinarily no bad results followed the accident. Some observers believed that the unexpected entrance of the sound to the handle, and the appearance of the point near the umbilicus was to be explained by its having been passed into and through the Fallopian tube. While this probably may occur where the uterine mouth of the tube is patulous, the investigations of Liebmann, of Trieste, have shown that the chances are greatly in favor of the perforation. He found that of one hundred fresh uteri, twenty-three were perforated by the sound very easily, forty-two easily, eleven with but slight force, and in twenty-four only was actual force required; of these last, eleven uteri were hyperplastic and thirteen normal. As a rule, the uteri of post-climacteric women were more easily perforated. Sims' flexible sound was able to perforate all but the more rigid walls. When there is reason to suspect a friable condition of the uterine tissue (subinvolution, displacement, with venous congestion, fatty degeneration—judging from other organs—or in anemia—senile atrophy, etc.) the sound should either not be passed at all, or a flexible probe or bougie substituted. Even though in the cases reported the perforation did not prove injurious, it can scarcely be considered a harmless matter thus to injure the peritoneum, and all proper precautions should be adopted to avoid it.

From what has already been said it is apparent that the introduction of a flexible probe or bougie is much less irritating and less likely to prove injurious in susceptible cases than the sound. The probes and bougies, however, requiring to be passed through a speculum, do not, in my opinion, give as much information as the sound.

Manner of Introducing the Sound.—I *always* introduce the *sound* by the touch (and *not* through the speculum) whenever a previous digital exami-

nation has shown me its probable feasibility, utility, and innocuousness. I prefer to be guided by my finger in this maneuvre rather than by the eye, for with the finger against the cervix I watch every step of the sound and every corresponding answer of the uterus, beyond the point accessible to the eye, the external os. Every obstacle, every deviation in the direction of the uterine canal is detected and gauged by two practised fingers, and overcome, and injury prevented by the combined action of two hands. Through the speculum the point of the sound is blindly thrust forward wherever the canal allows it to go, and valuable information imparted by the mobility and docility of the uterus under the domination of the sound is entirely lost. Introduced through the speculum, even though it be the Sims, the sound shows us only the patency, direction, and length of the uterine canal; but if there be obstacles to its progress, such as rugosities of the cervical mucous membrane, flexions or malposition of the uterus, the instrument will generally fail to pass the obstruction unless force be used or the tenaculum employed to straighten the uterus. Introduced on the finger, however, his practised touch enables the expert, with the aid of the internal finger, to overcome these and gently and safely pass the sound to the fundus. When the sound is counterindicated the probe comes into play, and it should be passed only through a Sims speculum. To introduce the sound, as many do, through a tubular or bivalve speculum is unscientific and useless, to say the least.

The patient occupies the dorsal position, the physician stands before her and, having made the ordinary digital and bimanual examination, and found an indication, and no counterindication for the sound, grasps the handle of the instrument between the tips of the thumb and first two fingers (like a penholder), and gently insinuates its point between the labia. In removing the sound from the basin of warm water, and anointing it, all clatter and display of the instrument should be avoided, as likely to alarm and annoy the patient. It is best not to refer to the intention of sounding at all, but to quietly introduce it under the sheet and merely make a soothing remark when the passage of the internal os or the touching of the fundus gives pain.

The examining finger, with its volar surface upward, rests against the lower lip of the cervix; the sound, with its convexity downward, is passed along the finger until it reaches the cervix, and the point is then gently insinuated into the os, and up the cervical canal until the region of the internal os is reached, that is, about one inch. As soon as the tip of the sound is engaged in the cervical canal, the middle finger is withdrawn from the handle, and the thumb and forefinger alone manage it with the utmost delicacy, scarcely more than touching the handle. If the uterus occupies the usual position of antecurvature, the sound will generally meet with a very slight impediment at the internal os, which is recognized by the expert, and immediately overcome by gently depressing the handle, when the tip will slip over the ring of the internal os and glide at once to the fundus. When the moment arrives to depress the handle in passing the internal os, it is convenient to change the position of the fingers, placing the tip of the

thumb on the handle, the index-finger below it. The sensation imparted to the finger of the examiner, when the sound touches the fundus, is that of a soft, semi-elastic resistance; the sensation experienced by the patient is that of a more or less acute pain near the umbilicus, but this only when the sound actually presses against the fundal mucous membrane. That the greatest delicacy is imperative in passing the sound through the internal os, is apparent, when we consider that the distance from that point to the fundus is only $1\frac{1}{2}''$, and that the sudden forcible passage of the apparent obstruction might result in the tip being driven sharply against the

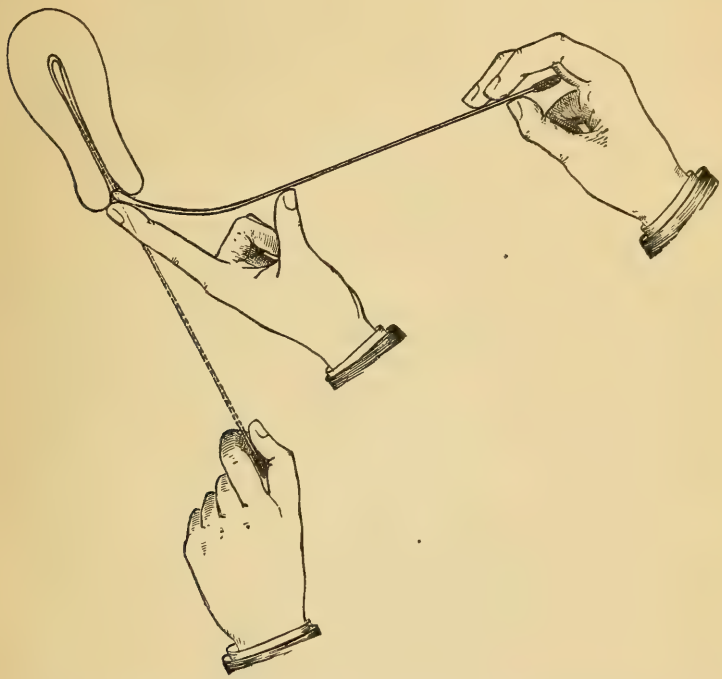


Fig. 66.—Position of Hands in Introducing the Sound into the External Os, and Change of Position as the Sound slips through the Internal Os (P. F. M.).

sensitive fundus, and perhaps through it. In fact, the less the fundus is irritated by the sound after it has once been touched the better. The fundus thus reached, and the patency of the uterine canal, and the tenderness of the internal os and fundus noted, the internal finger, which all this time has retained its position against the cervix, is pressed firmly against the sound at the spot where it issues from the os, and the sound is withdrawn with the finger in that position; the point thus marked on the sound will indicate the length of the uterine cavity. In a normal uterus the finger will be arrested at the small knob with which every Simpson sound is provided at a distance of $2\frac{1}{2}''$ from the tip. The approach of this knob should indeed be used as an alarm to the internal finger that the

tip of the sound is near, or at the fundus. The character of the secretion attached to the sound and finger, if any, should be noted.

When the uterus occupies the normal position, and the external and internal os and whole uterine canal are widely patent, and the latter devoid of entangling rugosities, the passage of the sound is an easy

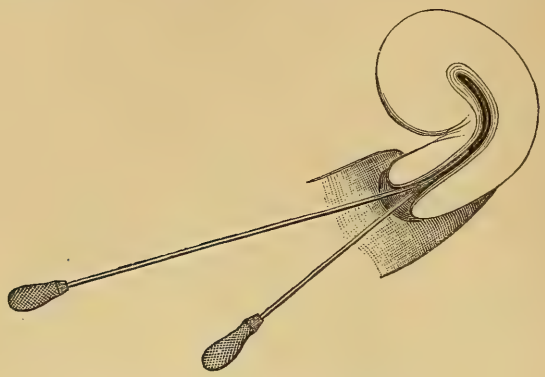


Fig. 67.—Manner of Introducing the Sound in Anteflexion (P. F. M.).

matter, even to the beginner. But, when the cervix is turned far back, or curled up anteriorly, when the external os is scarcely perceptible, or there is a sharp flexion, particularly anteflexion, of the body of the uterus, even the expert may fail at the first attempt. In a very small, or soft, or conical cervix, the external os may be hardly larger than a pin's head at the very apex of the cone, often with velvety lips, and therefore hard to detect and locate. Occasionally the speculum is required. If indagation has shown the uterus to be retrodisplaced, the sound will be introduced about up to the internal os, in the usual manner, and then gently rotated, and the handle raised instead of being depressed, as in antedisplacement; the

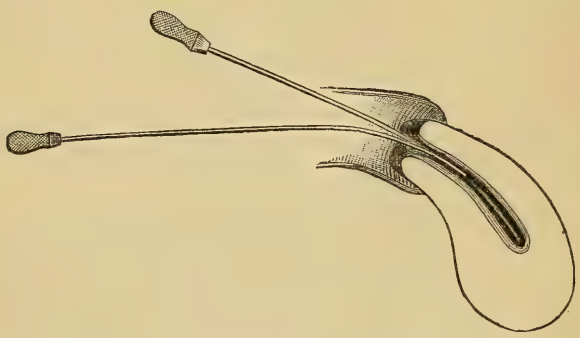


Fig. 68.—Manner of Introducing the Sound in Retroversion (P. F. M.).

point then glides over the internal os, and backward to the fundus, the concavity of the instrument looking backward. If there is an ante- or retroflexion, the uterine portion of the sound should be bent to correspond to the probable curve of the canal. This is chiefly necessary in anteflexion. Occasionally, however, cases are met with in which even the most acute

angle of flexion yields to the normal slight curvature of the sound; this occurs when the flexion is recent, or the uterine tissue is very flaccid or atrophic. Thus I recently saw such a case in a young lady twenty-two years of age, whose flexion was probably due to forced exercise while at boarding-school. Her uterus was flexed in the third degree, cervix and fundus touching; but the sound passed straight to the fundus, encountering almost no obstacle at the angle. As soon as it was withdrawn, the uterus returned to its flexion. A valuable hint for treatment was thus given, viz.: the uselessness of attempting to straighten so flabby a uterus by vaginal supports; a stem, probably a galvanic stem, was needed to straighten and stimulate the uterus to retain its erect shape. This feeling of relaxation of the uterus could never have been imparted by the sound alone through a speculum; the internal finger was needed to control the sensation.

It not unfrequently happens in apparently normal cases that the point of the sound is arrested in the cervical canal, or at the internal os; the point is then probably caught in some fold or pocket of the mucous membrane, and a little gentle, lateral, and perpendicular pendulum or rotary movement of the handle generally soon overcomes the obstacle. In some instances of anteflexion, I have found the uterus so movable that the mere pressure of the tip of the sound at the internal os would push the cervix so far back as to prevent the sound from entering the cavity of the uterus; the internal finger may then draw the cervix forward and thus straighten the uterus, or it may go in front of the cervix and push the body back, or the sound is grasped between the thumb and forefinger of the examining hand, and held *in situ*, while the external hand leaves the handle of the sound and through the abdominal wall presses the fundus back and, as it were, pushes the uterus down over the sound. Of course this must be done very gently.

I have found beginners to fail most frequently in passing the internal os, because they neglected to depress the handle sufficiently, or did so too soon before the tip had reached the internal os. In the former cases timidity was generally at fault, and after several ineffectual attempts, they would give it up. Nothing but practice can teach the beginner to appreciate and overcome these difficulties; they can merely be described on paper, their recognition must be learned by experience.

Some authors (chiefly English), recommend the introduction of the sound by the touch in the lateral position. It can be done, of course; but I fail to see the utility of substituting an inconvenient, and in no way preferable method, to one in every way suitable. The sound may also be used through the speculum (Sims', of course), and the length, width, and course of the canal thus ascertained. It will do as well as the probe in all cases where a flexible instrument is not preferable. To ascertain the width of the canal, Peaslee's thick sound is advisable. While I am perfectly familiar with the manner and also the advantages of introducing the sound through Sims' speculum, I still prefer to insert it ordinarily by the touch alone, for reasons sufficiently stated above. In practical matters of this kind each man must be his own authority.

The *probe* is introduced only through a speculum, always preferably the Sims. Its flexibility only allows it to follow the direction of the uterine canal; if the latter is particularly tortuous, the probe requires to be bent in various curves, according to the previous examination, until the correct one is finally found and the tip passes the obstruction. This curve, being retained on its withdrawal, gives the course of the uterine canal, a valuable piece of information. The paramount advantage of the probe over the sound is its safety, the slight irritation it produces, the absence of all force. Its disadvantages are the limited information it imparts, the ease with which its flexible or elastic tip is caught in a fold of the cervical mucous membrane, and its progress impeded or prevented, and the necessity of using a speculum through which to introduce it.

It is not necessary to describe the manner of passing the probe through a cylindrical or bivalve speculum, because the maneuvre is exceedingly simple and—because it frequently fails. Through the Sims speculum the method is as follows: The cervix, being exposed, is seized by the tenaculum and gently drawn down, thereby straightening the uterus; the left hand then taking the tenaculum, the right gently slips the probe into the uterus, having given it the curve which a previous examination has indicated. When the probe has reached the fundus, the right index is passed into the vagina, or the dressing forceps grasps the probe at the external os, and thus marks the length of the uterine canal, which must be measured by tape-measure, since the probes are not graduated.

The special indications for the use of the probe are either extreme narrowness or tortuosity of the uterine canal, or the necessity for exceeding gentleness for fear of re-exciting inflammatory processes, which even the probe *may* occasionally do.

The elastic probes of hard rubber or whalebone are used in very tortuous canals on account of their slenderness and weakness. Thomas' flat whalebone sound has already been described.

D. *Dilatation of the Uterus for Purposes of Diagnosis (Inspection and Indagation of the Dilated Uterus).*

It frequently becomes necessary, in order to settle a diagnosis, that a view of the endometrium be obtained, or, what is vastly more useful, that the finger be passed into the uterine cavity. In order to do this, the narrow uterine canal, ordinarily passable only for a sound, must be dilated to the width of at least an inch. This may be done by rapid forcible dilatation by means of powerful two- or three-branched diverging steel dilators, or by a gradual and slow dilatation with compressed cones of sponge (sponge-tents), swelling bougies of laminaria or tupelo; or again, by rubber tubes into which water is forced from a syringe until they have acquired the desired size. As all these manipulations require a certain amount of preparation, and are also used for therapeutical purposes, I will defer their description to the next chapter, and will only describe here the conditions

calling for inspection and indagation of the uterine cavity, and the results of such examination.

The information imparted by inspection of the cervical and uterine cavities, particularly of the latter, is exceedingly meagre. If the cervix is largely dilated, as immediately after abortion, childbirth, or the removal of a sponge-tent, or if it is lacerated, its walls may be separated by a steel dilator and a view of its cavity obtained through a Sims speculum almost up to the os internum; or the lips may be separated by forcing a tubular or bivalve speculum well up into the cul-de-sac. Useful information as to the color of the endocervical mucous membrane, especially as to the presence of hyperplastic follicles, may be thus obtained. To obtain a view of the upper portion of the cervical and any part of the uterine cavity proper, an instrument is required similar to that devised by Dr. Skene for the bladder. If the internal os is sufficiently dilated to admit one of the sizes of this endoscope, a view of the uterine mucosa, exactly proportionate to the diameter of the tube employed, will be obtained. By means of reflected (artificial) light this small disk may be clearly exposed. But, compared with the information imparted to that real eye of the gynecologist, the tip of his index-finger, this glimpse of the endometrium possesses but little value. With the cervix once dilated sufficiently to admit the endoscope, it will be found vastly more useful to pass the finger into the uterine cavity and *touch* its whole surface, than to *see* one small disk one-half to one inch in diameter. For it must be remembered that the tube cannot be shifted and pointed in different directions, as in the large sac of the bladder.

Passing the point of the index-finger into the cervical canal, and crowding down the fundus with the external hand, or drawing down the uterus with a double tenaculum inserted into the cervix, the finger first feels the endotrachelian mucosa, its roughness or smoothness, chiefly the condition of the follicles. If these are enlarged and the mucosa is unusually rugous, the endotrachelitis and the stringy discharge, which then doubtless exist, will not be curable by caustics or mild applications, but require the removal of the hyperplastic tissue by the sharp curette. Other pathological conditions, except, perhaps, a mucous or fibrous polypus, or a sacculated enlargement of the cervical canal, are not met with between the external and internal os. A malignant degeneration of the cervix can always be detected by the external touch of that part, and submucous fibroids in the tissue of the cervix alone and growing only toward that cavity are very rare. Disease of the mucous membrane or muscular tissue of the body of the uterus, is frequently met with and often recognizable only by the finger in the uterine cavity. It is true that by the aid of the curette and whalebone probes degeneration of the mucosa and submucous tumors may usually be recognized, but a positive diagnosis or confirmation can at times be obtained only by the finger. The pathological conditions thus calling for uterine indagation are, benign or malignant degeneration of the mucosa (hyperplastic pulpy condition of membrane, vegetations; diffuse or circumscribed sarcoma), submucous or interstitial fibroids and polypi, and retained portions of membranes or placenta (generally after miscarriage).

The removal of small portions of the mucous membrane or pathological growth (sarcoma, or placenta) and their examination under the microscope will generally clear the diagnosis without doubt; but in fibroids indagation is often the only means of ascertaining the presence, size, and attachment of the tumor. Thus, in differentiating between inversion of the uterus, and a fibroid polypus with thick pedicle, the finger alone can decide from which side the polypus springs, if it proves not to be an inversion.

E. *Examination of the Uterus with the Curette for Diagnostic Purposes.*

In disease of the endometrium it is often impossible to make a diagnosis without a macro- or microscopical examination of the affected tissue. I have already shown that an ocular inspection of the uterine cavity is limited and unsatisfactory; the only other means at our disposal are, therefore, to bring the diseased tissue, or a portion of it, where we can examine it at our leisure. This is done by introducing a spoon-shaped instrument with cutting or dull edges and removing a small portion of the mucous membrane or tumor; the character of the disease may be apparent at a glance, as in the common polypoid vegetations and granulations, and the diffuse pulpy hyperplasia of the mucous membrane; or other symptoms may call for microscopical examination, as in sarcoma. The curettes first devised and employed had semi-acute or cutting edges; Récamier's and Sims' curettes are representatives of this class.

The sharp edges, while invaluable where it is desired to cut deeply and remove all the diseased tissue, are obviously dangerous and certainly unnecessary when only a superficial shaving or a small particle is to be removed for purposes of diagnosis. The later instrument of Thomas is therefore greatly to be preferred to the sharp curettes, and answers every purpose. It is made of flexible copper wire, the loop being flattened on one surface so as to give it a dull edge, and the thinness of the wire at the neck of the loop and close to the handle renders the instrument almost incapable of sufficient impression to do injury. The loop in the smallest size made is one-sixth of an inch broad, but a loop of one-fourth inch is the size usually employed. The instrument is nine inches long, three inches and a half of which form the wooden handle, which is roughened on the surface corresponding to the scraping surface of the loop; the wire is one-sixth of an inch thick near the handle, and tapers down from one-twelfth to one-sixteenth of an inch thick at the inception of the loop. (See chapter on Therapeutic Curetting.)

Indications.—The *one* indication for the blunt curette as a means of diagnosis (I entirely omit the sharp curettes for this purpose) is the existence of pathological hemorrhage from the cavity of the uterus—menorrhagia or metrorrhagia—for which no adequate cause, constitutional or local, can be detected by the ordinary methods of exploration, and which has resisted the usual remedies. Experience has shown us that such uterine hemorrhage is very often due to the irritation produced by small

wart-like or polypoid growths in the uterine cavity, or to a pulpy, hyperplastic, and hyperemic friable condition of the mucous membrane, or to a granular condition of its surface, similar to that of a varicose ulcer; or, finally, to the retention of often very minute fragments of adherent placenta after miscarriage. Diffuse sarcoma of the mucous membrane is a rare affection, but as fatal as it is rare. Again, true cancerous degeneration of the mucous membrane of the cavity of the uterus proper occasionally occurs. In sarcoma and carcinoma of the body of the uterus the pelvic pains and cachexia will give some suspicion of the true nature of the case; but the hemorrhage, after all, is the main symptom, and the positive diagnosis can be made only by a microscopical examination of the diseased mass.

In all these cases the curette is indicated and will rarely fail. The withdrawal of small jelly-like bodies of a pale pink translucent color, and of the size of a canary-seed, or slightly larger, shows the presence of the condition known as endometritis polyposa. If thin slices of a pulpy tissue are removed, we have endrometritis hyperplastica; if merely stringy mucus, mixed with blood and shreds, comes away with the curette, we have endometritis granulosa or hemorrhagica; if small, firm masses of the size of a pea or bean are removed, the hemorrhage was due to retention of adherent placental villi; if, finally, friable, spongy, parti-colored masses are removed, especially if abundant, and perhaps offensive, the probability of malignant disease is great. Of course, such brief and general characteristics as I have here given cannot be considered pathognostic; the microscope can alone make the *positive* diagnosis, and I should advise that its decision be invoked in every case coming under this category before pronouncing either a diagnosis or a prognosis.

The peculiar sensation imparted to the finger on drawing the curette over the endometrium may give some hint as to the nature of the affection: if it is a grating, vegetations or placental fragments; if soft or spongy, one of the other conditions.

Counterindications are all conditions which would prohibit any interference with the endometrium, even sounding or probing, in fact all present or recent inflammatory trouble in or about the uterus.

Operation.—The smallest size of blunt curette (one-sixth inch loop) can generally be passed through every uterine canal, at least in women who have had a bloody or mucous discharge from the uterus for some time; for such a flow generally relaxes and dilates the canal. In case an obstacle is met with, and that will generally be at the internal os, the canal should be gently dilated with a steel or graduated dilator, or, in case of excessive rigidity, laminaria or sponge-tents may be required. For ordinary diagnostic curetting I do not remember ever needing more than rapid dilatation with a two-branched instrument to render the canal passable.

The curette may be introduced simply by the touch, but the removal and preservation of the products of the scraping would then be difficult. It is therefore always advisable to practice the curetting through a speculum, and then always a large bivalve or the Sims. A very large, tubular

speculum might possibly do, but the curette is really too short to be properly handled in that way. A bivalve is better, and will answer for many cases; but I, it need hardly be said, prefer the Sims in this, as in every measure, requiring a speculum. I shall, therefore, describe the operation through the latter instrument, since through the tubular and bivalve specula it consists merely in thrusting the properly bent curette up to the fundus, and withdrawing it with whatever comes with it. I must, however, admit that, in the absence of assistance, a bivalve will do for diagnostic curetting; for the therapeutical use of the scoop I should not recommend it.

The cervix being exposed through Sims' speculum, the anterior lip is seized with a tenaculum, and the uterus gently drawn down so as to straighten it; the probe or sound is passed to the fundus, and the direction and length of the canal and curve of the sound noted. I prefer the sound for this exploration, as it gives me a better idea of the width of the canal. The curette is then bent in the curve indicated by the sounding, seized between the thumb and two fingers of the right hand, and gently passed through the cervical canal and internal os. Arrived at the fundus, the curette is drawn gently (with thumb and index-finger) downward toward the internal os, taking successively the anterior, two lateral, and posterior surfaces of the uterus. The direction of the flattened, scraping surface is recognized by the corresponding roughness on the handle; of course the curette is bent so as to bring the scraping surface to correspond with the concavity of the shank. The four surfaces having been gently scraped, note being taken of the sensation thereby imparted to the fingers, the curette is withdrawn. With it there will generally be a slight oozing, in the midst of which will be found the results of the scraping, if there be any. The blood is wiped up with a bit of cotton-batting on the uterine dressing forceps, and carefully examined. If any of the substances above described have been removed, they will easily be recognized on the cotton by their characteristic appearance, and can be overlooked or mistaken for blood only through carelessness or ignorance. If nothing whatever but clear semi-coagulated or fluid blood and mucus appears on the cotton at first, the vagina should be again wiped out with fresh cotton, and perhaps a cotton-wrapped applicator may be passed to the fundus, on which the débris may be withdrawn. Occasionally the exploration is entirely negative, and then a point in the diagnosis is gained by elimination of intra-uterine disease.

A *diagnostic* curetting, done gently and *lege artis*, can be performed with as little risk as the introduction of the sound, and the patient be allowed to go about her usual duties soon afterward. The precaution of rest and care for several hours, of course, applies to this maneuvre even more than to the sound.

I have employed the curette in this way many times, and have never seen any other reaction than a slight, bloody oozing for a day or two. I always do it in my office or the out-door clinic. Any extra caution in the way of keeping the patient in bed or on the lounge for the rest

of the day can but be commended, if the medical attendant or the patient see fit.

F. *Artificial Prolapsus of the Uterus for Diagnostic Purposes.*

It has already been mentioned that the uterus can be seized by the single tenaculum and slightly drawn down and straightened, during an examination with the Sims speculum. A gentle traction of this kind requires but very little force, and can do no harm; its object really is more to steady the cervix and bring it in the line of vision than to draw it down.

But cases are not uncommonly met with in which it is desirable or necessary to dislocate the uterus downward to its utmost limit for purposes of diagnosis or treatment. Such cases are those in which the finger is to be passed into the uterine cavity; or into the rectum or bladder, or both, in order to make the diagnosis of retro- or ante-uterine growths, or differentiate between inversion of the uterus and fibroid polypus, by reaching the infundibulum of the inverted organ. For therapeutical purposes the artificial prolapsus is practised during the removal of intra-uterine growths (fibroids, polypi), during the operation for laceration of the cervix uteri, amputation of the cervix, and extirpation of the entire uterus per vaginam.

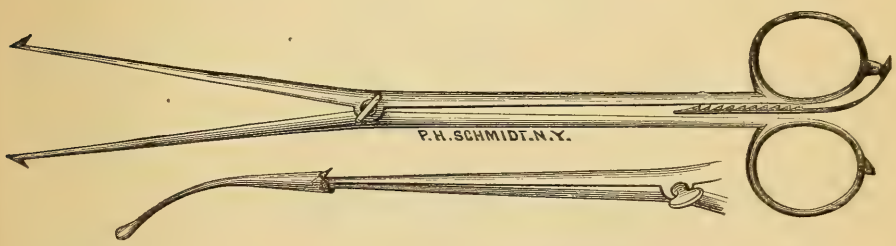


FIG. 69.—Noeggerath's Vulsella-forceps for Dislocating Uterus Downward; also with Sound attached for Lateral Dislocation.

The cervix of the normally movable uterus may be drawn down to the vulva by seizing it with a double tenaculum or a double-pronged hook. Or the more powerful vulsella may be used. If Hanks' double tenaculum is used, the cervix may be seized either by one lip, or both lips are grasped from within; with Noeggerath's instrument the grasp must be from within. The hooks may be fixed either by the touch or through the Sims or Simon speculum (the only available specula for this maneuvre). If the prolapsus is to facilitate indagation, a speculum is not necessary. If for operation, the Sims or Simon is indicated. Occasionally indagation may be practised on the uterus when it is drawn down in the speculum. When the traction ceases, the uterus rapidly returns to its site. A supposed inverted uterus is best drawn down by passing a broad tape about the pedicle and using it as a means of traction. A wire or thread loop may also

be passed through one or the other lips of the cervix and used as a tractile force.

Counterindications to this practice are fresh or chronic inflammatory deposits about the uterus; the latter, indeed, may fix the organ so firmly as to render its protraction impossible, while the former make it exceedingly dangerous. Occasionally an inflammatory reaction follows the artificial prolapse of even the normally mobile uterus. Quite recently Mermann, in Mannheim, Germany, reported a case in which rupture of an adherent inflamed and dilated Fallopian tube, with subsequent fatal peritonitis, occurred after the ordinary diagnostic prolapsus of the apparently perfectly mobile uterus. Of course, the presence of the serous salpingitis and the adhesions had not been suspected. Schröder pointed out, several years ago, the danger of accidentally tearing a pyo-salpinx during this maneuvre, but added that in more than two hundred instances of artificial prolapsus he had never witnessed any other reaction than a slight exacerbation of already existing perimetric exudation. It is evident that this method should never be employed needlessly, and only when the examination or operation cannot be as well performed with the uterus *in situ*.

In this connection it will not be amiss to refer to the injuries which may be inflicted on the cervix by the single or double tenaculum. One of the objections advanced against the Sims speculum by those conservative gynecologists who have never really acquired the knowledge how to use it, is the wounding and laceration of the cervix by the tenaculum required to attract and steady the uterus; such lacerations, they claim, besides being a needless disfigurement, open the channel to septic infection, and may be followed by severe hemorrhage. It is true, the cervix is occasionally quite severely torn by the tenaculum, but this accident is usually more annoying to the physician, who again and again loses his hold on the brittle and friable tissue of the part, than injurious to the patient. In the normal cervix the tenaculum (at least the properly curved tenaculum shown on page 84) rarely tears out when properly implanted; and, to my knowledge, no injurious results whatever have ever followed this simple puncture. In those cases in which the hook tears out, and gashes are made in the cervix, the latter is generally in a condition of so-called "cystic hyperplasia," its tissue and surface interspersed with distended mucous follicles, the friable walls of which afford almost no resistance to traction by the hook. Such gashes are always superficial and, emptying as they do the distended follicles, rather do good than harm, accomplishing what systematic puncture and scarification is employed for. I have never seen the slightest ill-effects follow any of the innumerable tenaculum-punctures which I have inflicted. Occasionally, an ectatic vein may be pricked by the tenaculum, and quite profuse hemorrhage occur, but this is instantly arrested by a cotton tampon, steeped in an alum or tannin solution if necessary.

G. *Examination of the Rectum with the Speculum.*

Various bi- and trivalve specula for the rectum are for sale and more or less used, but they possess, in reality, no advantages over two Sims specula, one for the anterior, and one for the posterior wall; or a simple Ferguson or hard-rubber cylindrical vaginal speculum will answer admirably for many purposes. The principle intended in Thebaud's sphincter ani dilator is precisely identical with that of the two Sims above mentioned.

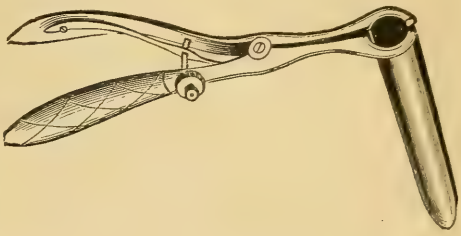


Fig. 70.—Bivalve Anal Speculum.

Indications.—Whenever deep-seated disease of the rectum is suspected, and the digital eversion of the lower two inches of the gut through the vagina does not reveal the trouble, a specular examination is called for. Such deeper-seated disease may be a stricture, a recto-vaginal fistula, a fistulous opening of a pelvic abscess, an ulcer, internal hemorrhoids, or a catarrhal inflammation of the rectal mucosa, a proctitis. One or the other of these affections is not unfrequently met with as a complication of uterine disease, and the indication, therefore, frequently arises for a rectal examination as a means of detecting the source of rectal pains or discharges. Painful defecation, and the discharge of mucus or purulent matter from the rectum perhaps gives the most frequent incentive to such a course.

Operation.—As even the digital eversion of the rectum from the vagina gives some pain, chiefly through the dilatation of the sphincter ani in forcing the anterior rectal wall through it, so will the distention of the sphincter by a speculum be exceedingly painful, and require the administration of an anesthetic. A mere preparatory inspection of the lower half of the rectum through a smallest sized tubular, bivalve, or Sims speculum can thus be made without injuring or previously dilating the sphincter ani. But a clear view of the canal can only be obtained by introducing a large instrument, and this requires a painful stretching of the sphincter, which is rarely practicable without anesthesia.

The patient, being anesthetized, is placed in the lateral position (I prefer the left for this, as for almost every manipulation in the lateral decubitus) and a medium cylindrical speculum forced through the sphincter into the rectum. If the resistance of the sphincter is once overcome, the expanded rectum offers no obstacle to the progress of the tube up to its hilt. Should the sphincter oppose the introduction of the speculum, it will either be necessary to make the examination with a dilating speculum or with two small Sims, which are readily passed through a normally contracted sphincter ani (one anterior, the other posterior); or, if the view thus obtained is not sufficient, the forcible hyperdistention of the sphincter

should precede the examination, provided the necessity for the latter calls for so severe a measure. This hyperdistention of the sphincter is very rapidly performed, by introducing the two thumbs up to the root into the rectum, placing the four fingers of either hand on each natis, and steadily and forcibly separating the thumbs until they are arrested by the tuber ischii on each side. The anus then becomes a yawning cavity of at least three inches diameter, and the red, pouting rectal mucosa bursts into view to the depth of three or four inches. The external and internal sphincter may be merely stretched and temporarily paralyzed, or their fibres are entirely or partly torn ; the mucous border of the anus is generally nicked in several places, and there may be slight hemorrhage. The consequences of the operation are none but beneficial when it is employed for therapeutical purposes (as for the cure of fissure of the anus, for which it is a specific) and innocuous when used as a means of diagnosis ; the incontinence following it rarely lasts longer than a few days. The field of vision opened by this hyperdilatation may render a further specular examination unnecessary ; but generally the mucous membrane falls forward so as to obscure the unobstructed view, and a speculum or retractors are required to separate the walls.

A large-sized cylinder will now afford a good view, which can likewise be obtained through two Sims specula, one retracting the posterior, and the other the anterior wall of the rectum. To view successively the whole circumference of the rectal tube without obstruction by the blade of a speculum, a cylinder is perhaps preferable to the two Sims.

It should be noted that the mucous membrane of the rectum is of a bright red color, not pale pink like the vagina. If it has a bluish or dark red color, however, it is congested or inflamed, and in need of treatment ; so, also, if it is coated with thick, stringy mucus.

Applications of fluid medicinal substances may be made either through the cylindrical or double Sims specula. If the cylinder is used, the fluid may be poured into the speculum and brought in contact with the interior of the rectum by withdrawing the speculum or mopping it on the mucous membrane with a sponge on a holder, or cotton on a whalebone stick ; the latter is also the method of applying fluid agents through the Sims. Powders (iodoform, bismuth, etc.), may likewise be applied in this way, or by insufflation. Solid substances, such as the stick of silver-nitrate to distinct spots, as ulcers or chancres, are best applied through the two Sims, as, indeed, nitric acid on a stick when also used to touch ulcers. If a stricture close above or at the internal sphincter interferes with the examination, it should be divided or dilated. If the examination is repeated within a week it will generally be found easy to dilate the sphincter with the speculum, without the forcible overdistention first employed ; later, the normal contraction of the muscle will, in the vast majority of cases, have returned.

The importance of inspection and local treatment of the rectum has been recognized only within recent years, and is particularly to be insisted on in the female sex, in whom affections above the internal sphincter are

more common than in the male (such as catarrhal inflammation, stricture, internal hemorrhoids, internal pelvic fistula) and either simulate or are closely connected with and productive of uterine disease.

H. *Mensuration of the Abdomen and Pelvis.*

The measurement of the female pelvis is ordinarily useful only during pregnancy as a prognostic sign of impending labor. But during the non-puerperal condition it may, at times, be valuable in cases of large, fibroid tumors of the uterus, when the question of removal of the growth per vaginam is under discussion. A growth of moderate size may be removed entire, but in a contracted pelvis its previous segmentation would probably be necessary.

The mensuration of the abdomen, on the other hand, is of decided importance in gynecology. It is chiefly useful in determining the dimensions of that cavity in uterine and ovarian tumors, and the relative distention of different portions of the cavity. Measurements may be made either with a tape-measure, or with calipers. The chief measurements are the following:

Circumference at umbilicus or at highest point of abdomen.
Distance from ensiform process to symphysis pubis.
Distance from ensiform process to umbilicus.
Distance from umbilicus to symphysis.
Distance from umbilicus to anterior superior spinous process of ilium of either side.
Distance from linea alba to corresponding spinous process of vertebra.

By repeating these measurements at intervals, the degree and manner of the growth of the abdomen may be watched. Thus, one-half of the abdomen may grow more and faster than the other, or the distance between xyphoid process and symphysis may vary, according to the position of the tumor on one side or the other.

All measurements should be taken on the bare skin, after evacuation of bladder and rectum. The patient occupies the recumbent position; the erect posture is neither so convenient nor decent, and offers no advantages except the greater projection of the abdomen, which may mislead the examiner. The tape-measure should be exactly contiguous to the skin and not indent it; a flexible lead measure may be usefully employed to obtain the exact dimensions and shape, like a cast, of one-half of the abdominal outline. Hegar and Kaltenbach point out that in ascites and tympanites the curved line is that of a circle, while in abdominal tumors the line is irregular or like the segment of a cone.

I. *Aspiration of Abdominal and Pelvic Tumors.*

It is frequently impossible to make a diagnosis of the nature of an abdominal or pelvic tumor, whether its contents are solid or fluid, and

if the latter, whether it is serum or pus or blood, by the rational signs and diagnostic means (palpation, percussion, indagation, etc.) already described. Fortunately, we have in the exploring needle an instrument which enables us to solve the problem in a large proportion of cases. This instrument has been in use many years, and consists in a slender hollow needle not larger than a thick sewing-needle, and from two inches to six inches long, which is thrust into the tumor, and through which a drop or more of the fluid oozes, if there be fluid in the growth. Such minute punctures are not productive of harm in so far as the mere wound is concerned. But they are often followed by serious results in consequence of the entrance of air through the open tube, the ensuing decomposition of the cyst-contents, and speedy septicemia and death. Besides, in many instances, the fluid is too thick or the intracystic pressure not sufficiently strong to force the fluid through the needle, and the diagnosis therefore fails. For these reasons a complicated contrivance called an aspirator has been devised, which permits the removal of as much of the fluid as is desired with the absolute exclusion of air. The instrument now in common use is that of Dieulafoy or one of its modifications. It consists of a syringe with double current stopcock, one current leading to a flexible tube to which the hollow needle is attached, the other to a second tube, one end of which empties in an air-tight bottle, into which the fluid removed from the tumor is pressed by simply closing the respective tube when the syringe has been drawn full, and pushing down the piston of the syringe.

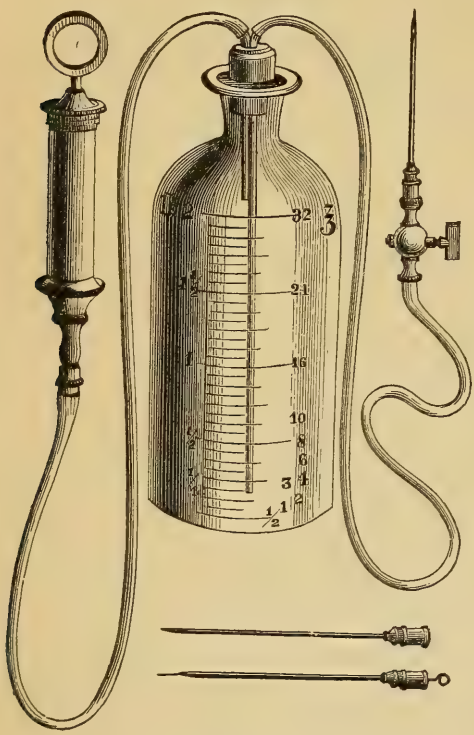


Fig. 71.—Modified Dieulafoy's Aspirator.

The aspirations may be either partial, for diagnosis only, or be continued until the tumor is emptied of its fluid contents. There are three or four needles of different sizes with each instrument, the smallest of which is about as thick as a large sewing-needle (for thin fluids), the largest larger than a thick knitting-needle (for thick fluids, like pus and some ovarian fluids).

The abdominal tumors which most frequently defy the ordinary diagnostic resources are ovarian cysts, cysts of the broad ligament, and fibro-cysts of the uterus. The differential diagnosis between these three varieties is often a matter of the greatest difficulty. Only by a microscopical and chemical examination of the fluid removed by the aspirator can the diagnosis be made in many cases, and upon this depends the treatment, which in these cases is usually a question of life or death. In ovarian cysts the fluid is generally straw-colored, often brownish like chocolate, viscid, coagulating by heat and nitric acid, containing a large amount of albumen ; the microscope shows, besides pavement epithelium and granular and fatty matter, a peculiar granular cell, the "ovarian corpuscle" first discovered by Drysdale, of Philadelphia, and by him declared pathognomonic. The fluid of cysts of the broad ligament is mostly clear, like water, not viscid, contains no granular cells, and does not coagulate, possessing only a rather mystical albuminoid substance, the metalbumen. Fibro-cysts of the uterus again contain a light yellow, thin, non-viscid fluid, which possesses no special characteristics. Other tumors resembling those mentioned are cysts of the liver, kidney, mesentery, and hydatid growths. Cysts of the liver yield a yellow fluid, in which the microscope detects liver-cells in a more or less perfect condition. (I have met with one such case, and made the diagnosis in the manner indicated.) Hydatid cysts are recognized by the peculiar hooklets of the parasite, seen under the microscope ; and the fluid from cysts of the kidney may show the presence of urea. Fluid from cysts of the mesentery, so far as I know, possess no characteristic chemical or microscopical distinctness. Besides these actual tumors, there are other conditions of the abdominal cavity which simulate tumors, and require the aspirator needle to make the differential diagnosis. Such are ordinary ascites, encysted peritoneal abscess, and extra-uterine pregnancy with death of the fetus. The non-viscidity, clear, very light yellow color of the fluid and its coagulation on standing, will serve to point out ascites, without the microscope, which would reveal nothing except perhaps large tessellated epithelium from the peritoneum. The withdrawal of pus in encysted abscess would show the presence of suppuration, if not its precise origin or situation. In old extra-uterine pregnancy the diagnosis is less easy ; pus may be found, but in several cases the "pathognomonic" ovarian corpuscle has also been detected. Drysdale himself claims to be able to decide any case in the fluid of which he himself discovers the corpuscle to be ovarian, and he has never missed, I believe ; but others have not been so successful, and have found the corpuscle in the fluid from abdominal pregnancy and uterine cysts.

So far as the differential diagnosis by the microscope between unilocular ovarian cysts and cysts of the broad ligament is concerned, Garrigues, in his recent elaborate article in the *American Journal of Obstetrics* for January, April, and July, 1882, says that there is no absolute, *unfailing* sign by which the fluid from these two varieties of cysts can be distinguished. The same may be said to hold good for many fibrocysts of the uterus. It is only by repeated careful examination and thorough weighing of the

testimony for either side that a correct diagnosis may often be reached in these doubtful cases.

In pelvic tumors, which are detected and reached only or best through the vagina, the aspirator-needle is often quite as valuable an auxiliary to diagnosis. It enables us to determine whether a tense elastic tumor in the broad ligament contains serum, is in fact a beginning ovarian or ligament cyst, or whether its contents are deep-seated pus. It reveals to us the nature of a large, doughy, retro-uterine swelling, whether it is the result of an intraperitoneal effusion of blood (hematocele), or whether pus has formed in an exudation of plastic lymph. It enables us, finally, to detect the cause of the rigors, increased pulse and temperature, and general cachexia, in a patient with an old obscure pelvic cellulitis in one broad ligament or the other, by showing us that the peculiar boggy feel of the exudation tumor and its persistence in spite of all treatment are due to the presence of a small quantity (often not more than one ounce) of thick pus deep within the exudation, the removal of which through that very aspirator-needle rapidly cures the patient. I have recently been using the aspirator in this particular class of cases with the most gratifying results, having cured previously intractable cases of pelvic cellulitis, in which the swelling had persisted for several months and the cause had not been suspected, within a few weeks by simply removing an ounce or two of pus per vaginam.

The introduction of the aspirator-needle is exceedingly simple. If it is desired to aspirate an *abdominal tumor*, it is merely necessary to select a spot where percussion shows the absence of intestines or other vital organs, and where palpation renders the presence of fluid probable, and there plunge the needle (using, of course, the finest size likely to be successful) to its hilt into the growth. Accordingly as the object is diagnosis or removal of all the fluid, will the aspiration be confined to one syringeful, or continued until the cyst is empty. After withdrawing the needle a bit of adhesive plaster is placed over the minute puncture.

In spite of the ease with which the aspiration through the abdominal wall is made, the small size of the opening (if, as always should be done, the smallest sized needle is used), and the tolerance of the peritoneum to injuries nowadays, a number of instances have been reported in which careful aspiration of ovarian tumors was followed by peritonitis, decomposition of the contents of the tumor, and death. I myself had such a case, and was obliged to perform ovariotomy in the height of a furious septic peritonitis, prolonging life by only six days. Consequently it was proposed by Dr. Henry F. Walker, of New York, always to use the hypodermic syringe for *diagnostic* aspiration, and this is the instrument now almost solely employed for the purpose. Ordinary ovarian fluid, of not too great viscidity, will flow through the hypodermic needle. Even from this slight injury one case of (not fatal) peritonitis has been reported by Fauntleroy, of Virginia.

Through the vagina the operation is slightly more difficult, in accordance with the diminished accessibility of the swelling. The aspirator-

needle may either be passed in on the finger, care being taken to avoid injuring the woman unnecessarily or pricking one's own finger (this may be avoided by guarding the needle point with a small cork which is slipped off when the vaginal roof is reached) ; or the vaginal walls may be freely exposed with a Sims speculum and the needle inserted through it in the spot previously determined by the touch and palpation. The important point is to make out the exact spot where the presence of fluid seems most probable, and remembering it, insert the needle there, and gently but firmly thrust it upward in the direction in which previous exploration has shown the bulk of the swelling to be situated. In inserting the needle care should be taken to avoid puncturing one of the large arterial branches which are easily felt pulsating in the roof of the vagina. When the needle has penetrated as far as seems advisable, judging by the size of the tumor, the piston of the syringe may be drawn back (it is well to have an assistant to do this, while the operator steadies the needle and tube), and the expression of the contents into the bottle will show whether the tumor contains fluid and what it is. If the first attempt is unsuccessful, the needle may be thrust in a little deeper, or in a different direction ; indeed, I have repeatedly reintroduced the needle as often as seven or eight times at the same sitting, finding a little pus at each puncture, until the whole supply was exhausted. In such cases no doubt there were a number of small abscesses.

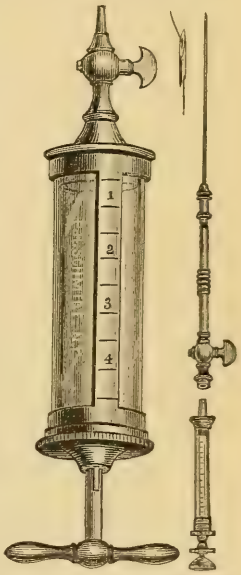


Fig. 72.—Aspirator-syringe, with Long, Slender Needle and Hypodermic Syringe Attachment (P. F. M.).

In passing the needle through the vagina into a swelling above the vaginal roof I decidedly prefer to guide the needle on my finger, because by so doing I can be very much more certain that I am introducing it in the right direction, and how far it is inserted, besides being able to steady the swelling and press it gently down against the needle with the other hand on the abdomen.

Generally, when the needle has struck pus, the sudden cessation of all resistance is marked, and the point can be freely moved about in the cavity of the abscess, if it contains at least half an ounce. Often the intervening plastic lymph is so dense as to creak almost like cartilage as the needle is forced through it.

In order to avoid the cumbersome apparatus of a Dieulafoy's aspirator, I have had a glass syringe made holding four ounces, the nozzle of which is provided with a stopcock. To this nozzle is attached a slender metal tube, four inches long, also with a stopcock, and to this tube the needle, each being separate. My method of procedure is usually the following: Having selected the spot where I think fluid is most likely to be found, I attach the slender tube with the needle (4 inches long) to my ordinary hypodermic syringe (to the tip of which the tube has been made to fit),

and have now an aspirator 10 inches long (needle 4 inches, tube with stopcock 4 inches, syringe 2 inches), which I introduce on my finger into the vagina. The needle-point is guarded by a cork, which I slip off when the chosen spot at the vaginal roof is reached, and the needle is driven into the tumor. The stopcock is now opened, and the syringe-piston drawn back. If fluid follows, I close the stopcock, remove the hypodermic syringe, attach the large syringe, and withdraw all the fluid. In this way air is prevented from entering the tumor, by closing the stopcock before detaching the hypodermic syringe; and I am enabled to follow the diagnostic aspiration by the immediate removal of the fluid without reintroduction of the needle, if thought advisable. This apparatus is cheap, serviceable, and convenient in all cases where, as is usually the case in these obscure pelvic abscesses and small cysts, the quantity of fluid to be removed is only a few ounces.

Mr. Philip H. Schmidt, instrument-maker, of this city, has made for me a very convenient and portable case containing the instruments above named, with the substitution of a smaller syringe, holding but one ounce, for the large one, and with the addition of several long needles, a trocar, and a sharp director-needle.

I have thus far met with no unpleasant reaction in cases of pelvic abscess after this procedure. The exclusion of air, the small size of the needle, and probably the hardened character of the tissues may account in part for this immunity. Other operators report precisely the same absence of reaction.

But in one case of doubtful pelvic cyst, where vaginal aspiration in my office showed the mass to be an ovarian polycyst, I was subsequently informed that a violent peritonitis set in, which confined the patient to her bed for a long time. Hence I should certainly advise against this practice in *intraperitoneal* cysts, the walls of which are not agglutinated to the pelvic peritoneum. In cysts of the broad ligament (the fluid of which is bland) and pelvic abscesses there is but little danger attached to it.

I have practised this diagnostic aspiration in the outdoor clinic and once (in a case of small cyst of the broad ligament) in my office; but I should certainly advise it always to be done at the home of the patient. Indeed, this is usually indispensable, as such patients are generally little able to walk about. Hot applications to the hypogastrium and rest in bed for a day or two are useful prophylactics after the operation. In case of pain a hypodermic or suppository of morphine should be given.

Examination by Reflected Light.

Ordinary bright daylight answers every purpose for the inspection of the genital organs, both external and internal. But it frequently happens that the daylight is less bright than usual, or the window through which it shines is inconveniently situated in respect to the position of the patient, who for reasons of time or expediency cannot be shifted to a better location; or an examination or operation may have to be done by artificial

light. For the purpose of throwing the sunlight on a given spot—for instance, into the recesses of the abdominal or pelvic cavity—a common concave hand or frontal mirror may be used. The same instrument also answers very well for the reflection of artificial light, and has the advantage over more powerful reflectors in being easily portable. In the absence of a mirror a very simple and fairly efficient reflector to a limited extent is rapidly constructed by fastening a bright pewter or silver table-spoon against a candle with the bowl on a level with the flame, as shown in Fig. 73; or, a plain reflector of tin may be slipped over a German student's lamp, or more elaborate reflectors of glass or polished metal may be attached to extensible gas-pipes. I have found the reflector shown in Fig. 75 to answer every purpose of efficiency and economy.

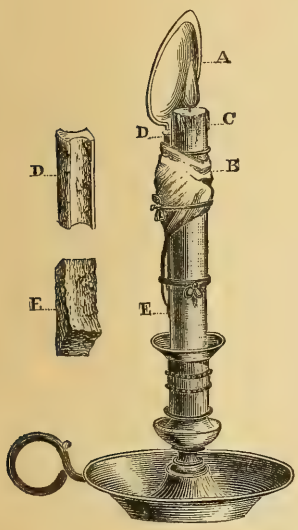


Fig. 73.

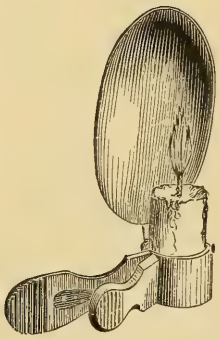


Fig. 74.

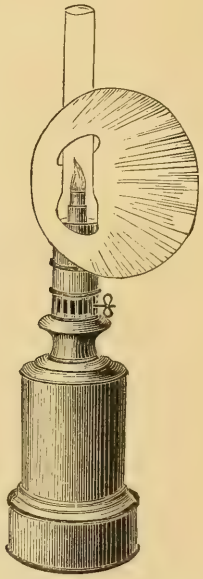


Fig. 75.

Fig. 73.—Improvised Reflector. D, E, pieces of cork cut to fit the candle, for the spoon-handle to rest against. (Leblond.)

Figs. 74 and 75.—Reflectors for Specular Examination. (Leblond.)

A very neat portable electric light has recently been introduced by the Excelsior Manufacturing Co. of New York. The small size of the burner and the comparative absence of reflected heat permit the introduction of the incandescent tip into the vagina through a speculum, and I have found it of decided benefit in lighting up that canal on dark days. The construction of the battery is exceedingly simple, and it is not very expensive. It is shown in Fig. 76. The size of the battery with case is $5\frac{1}{4}''$ by $4''$ by $1\frac{1}{4}''$, it being thus really a pocket battery.

By a clear, well-reflected light every examination and operation may be performed as well as by daylight. I once assisted at an operation for laceration of the cervix uteri by artificial reflected light, and was exceed-

ingly pleased at the brightness of the field of operation. In judging of the exact color of the vagina and cervix, clear bright sunlight is preferable to yellow candle or gaslight.

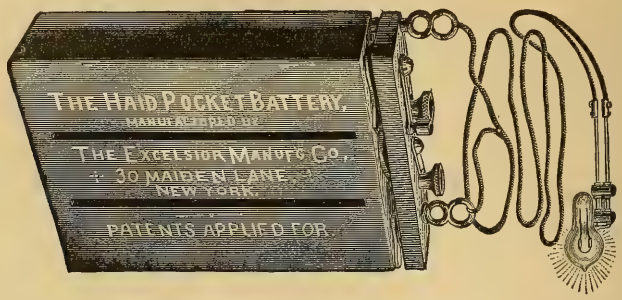


FIG. 76.—Haid Portable Electric Light.

GYNECOLOGICAL CASE-SCHEDULE.

A systematic course of inquiry and examination, both oral and physical, is quite as important in taking the history and making the diagnosis of a case of utero-ovario-pelvic disease as it is in any other branch of practical medicine. For this purpose a printed schedule is eminently useful, which when filled out affords besides a full record of the case for future reference. The form printed on the next page is one which I have been using for ten years, and have found to answer the needs of a miscellaneous gynecological practice. For special operations, such as ovariotomy, laparo-hysterotomy, etc., separate schedules should be prepared; those of Spencer Wells or H. Lenox Hodge are excellent. More elaborate schedules, giving a full page or more to each case, may be prepared; but I have found that in busy practice such large blanks are rarely filled out.

Three or four of such forms under one top-heading may be printed on one sheet of the Case-book, and the book thus prepared will not exceed a convenient size for office use. The one I use measures eleven inches in breadth, and fifteen inches in length, and has three forms to the double page, under one general top-heading.

When the examination has been concluded, the physician should give his opinion of the patient's case in as few words as possible, avoiding all ambiguity, confusing medical phrases, and unnecessary explanations. Intelligent patients generally desire to know their exact condition, and it may, therefore, be proper and wise for the physician to gratify the patient's natural curiosity by showing her, by a diagram, what that condition is, if his judgment tells him that she is a proper person. I have a blackboard in my office for the purpose.

When asked as to the prognosis, the physician should neither exaggerate the severity of the case nor the urgency for treatment with the (to a certain degree justifiable) object of inducing the patient to take treatment which she greatly needs and might defer, if her case were not strongly

No.

Date.

Name. Age. Address.

Social Position. Occupation.

Married or Single.

How long Married.

Number of Children.

Number of Miscarriages.

Date of last Delivery or Miscarriage.

Duration of Illness.

Previous Diseases.

Health of Parents.

Prominent Symptoms.

Menstruation.
- First appearance.
- Regularity.
- Duration.
- Amount and character.
- Pain, during, before, or after.
- Last appearance.

Pain.
- In back.
- In legs.
- In abdomen.
- In head.
- In thorax.
- In intercourse.
- In sitting.

Locomotion.
- In standing.
- In walking.

General health.
Appetite. Digestion.

Defecation.
- Regularity.
- Pain during.

Urination.

Vaginal Discharge.
- Character.
- Amount.
- Persistence.
- Duration.

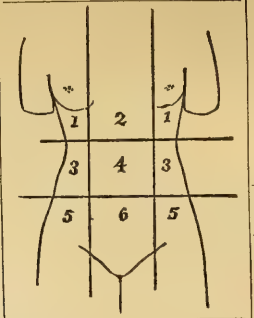
Physical Signs.

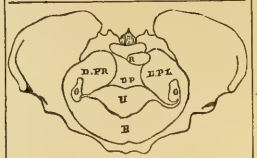
Uterus.
- Position.
- Shape.
- Size.
- Length of cavity.
- Mobility.

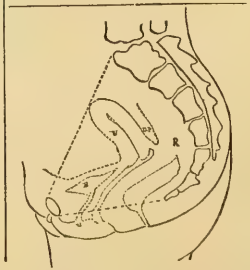
Cervix.
- Shape.
- Length.
- External os.
- Internal os.
- Density.
- Secretion.

Douglas' pouch.
Vaginal vault.
Ovaries.
Tubes.
Broad ligaments.
Vagina
External genitals.
Bladder.
Rectum.
Pelvis.
Other organs.

Diagnosis.[1]







Treatment.

General.

Local.

Progress.

Termination.

[1] 1, 1, Hypochondriac region; 2, Epigastric region; 3, 3, Lumbar region; 4, Umbilical region; 5, 5, Ovarian or iliac region; 6. Hypogastric region. D. P., Douglas' pouch; D. P. R., Douglas' pouch, right; D. P. L., Douglas' pouch, left; O. O., Ovaries. U., Uterus; B., Bladder; R., Rectum.

put to her; neither should he undervalue the affection and the time which it may take to effect a cure or procure relief. In the former case the patient might consult another physician and tell him of the grave opinion given by the first gentleman, which the second finds unwarranted by the facts; and in the latter instance, if the case turns out more tedious and intractable than was expected, the patient holds the physician responsible for her disappointment, and blames him herself and to her friends accordingly. It is always advisable to acquaint the patient with the gravity of her case (without unnecessarily alarming her), and tell her whether a speedy or eventual cure may be expected, or whether her case is but little likely to be benefited. In intractable chronic affections, like areolar hyperplasia, chronic ovaritis, chronic pelvic peritonitis and cellulitis, it is always well to tell patients that much good can be done them and some improvement obtained by persistent local treatment for several months, but that a complete cure may perhaps never be achieved. Of course I do not advise that the few remaining months of a patient suffering from cancer should be embittered by her being told of her hopeless condition as soon as it is discovered, unless she positively demands the truth, or family reasons require that she be undeceived in her hope of recovery. The relatives should, however, always be informed of the fact, and the futility of all but palliative remedies.

PART II.

MINOR GYNECOLOGICAL MANIPULATIONS AND APPLICATIONS.

I. CATHETERIZATION.

The indications for removing the urine of a woman by artificial means need hardly be specified, since they are usually comprised in the one fact—the inability of the woman to empty her bladder herself. There are, however, four other conditions in which it may be desirable to remove the urine by the catheter, viz. : 1, when the patient is unable to pass urine in the ordinary erect position, and it is important to prevent the urine from touching the external genitals, as would be the case if she passed it in the dorsal supine position (after the operation for laceration of the perineum) ; 2, when the bladder is to be preserved from distention, as after the operation for vesico-vaginal fistula, when a permanent catheter is usually introduced until the wound is healed ; 3, when it is intended to secure a specimen of urine entirely free from utero-vagino-vulvar or lochial discharge, as for microscopic examination ; 4, when the woman is under an anesthetic. The mere fact that the patient claims not to be able to pass urine does not prove that the bladder is distended ; she may have passed it unknowingly while at stool, or the kidneys may not be doing their duty, or the skin and other emunctories may have temporarily supplied their place. Neither does the statement of patient or nurse, that the urine has been regularly passed, positively demonstrate the emptiness of the bladder. It not unfrequently happens after confinement or operation that the nurse or patient, or both, make this assertion, and the physician, seeking the cause of the feverish condition of his patient, finds the bladder distended nearly to the umbilicus, with the urine dripping away, like the overflow from a tank, and removes with the catheter pints of foul, decomposed urine. There was temporary retention from compression and edema or spasm at the neck of the bladder, or the elongated urethra (during pregnancy) became flexed on the descent of the uterus after delivery, and the flow of urine was thus obstructed (Olshausen's explanation of the frequent temporary retention of urine immediately after de-

livery) ; the detrusor vesicæ then became paralyzed, unaided as it was by pressure from the now flabby abdominal muscles, and the bladder continued to enlarge until the sphincter-like fibres at the neck of the bladder yielded, and allowed the escape of a few drops. Such a condition as this cannot miss detection if the proper external examination is made. In no case, therefore, in which there is any suspicion of trouble in the function of micturition should a careful physical examination of the vesical region by palpation and percussion be omitted.

No person acquainted with the anatomy of the parts, need be told how to introduce a catheter into the female bladder when the meatus urinarius is exposed to sight ; gentleness and caution in the introduction and removal are the only directions to be given. But to find the meatus and introduce the catheter by the touch alone, is quite another and more difficult matter, requiring a touch practised in detecting the location of the opening. This knowledge is obtained only by frequent education of the tip of the index-finger in the peculiar sensation imparted by the small circular ring of the meatus. The acquisition of this faculty is by no means unimportant, for it enables us to avoid the always disagreeable exposure of the person, and may at times be indispensable when edema of the labia interferes with inspection of the vestitbule, or he presence of sutures in the perineum renders a separation of the labia, for the purpose of exposing the meatus, unadvisable. The rule holds good in this maneuvre, as in every other performed on the female genital organs, that while a *necessary* exposure should never be omitted for mere reasons of prudery, such exposure should not be inflicted when the examination or manipulation can be as well performed under the clothes. The practitioner should, therefore, accustom himself to the touch of the female urinary meatus in order that he may recognize it when he is called upon to empty a patient's bladder.

Standing somewhat to the side of the patient, who lies with thighs separated (not necessarily also elevated), the index-finger of either hand is slipped from the perineum into the vagina, and then out again over the concave border of the symphysis of the pubic arch (where it glides along the bulbous projection of the urethra) on the vestibule, where it searches for a small depression barely large enough to admit the very tip of the finger. This small circular opening is situated about one-third of the distance up the vestibule, the urethra curving slightly upward ; it is recognized by the comparatively sharp ring formed by the edge of the meatus when it is distended by the finger-tip. It is the detection of this small ring by the touch which constitutes the only difficulty in the maneuvre. The finger having found the meatus, presses gently against it, with the volar surface upward ; the catheter (metal or elastic ; if the latter, with or without mandrin) is seized in the three fingers of the other hand (the index closing the mouth) and passed on the index-finger into the meatus, precisely as the sound is passed into the uterus. When the tip of the catheter is felt to enter the urethra the other end is depressed, and the instrument gently pushed forward until the cessation of even

slight resistance shows that it has entered the bladder. The finger is now removed from the mouth of the catheter, and the urine allowed to escape into the vessel held ready for it. I prefer a cup or bowl for this purpose, which can be placed between the thighs and does not occupy as much space as a chamber vessel. When the urine ceases to flow, gentle pressure may be made over the pubis, or the catheter pushed in a little deeper or withdrawn a short distance in order to catch whatever urine may have been retained in diverticles of the bladder. When the last drop has escaped, the catheter is again seized between the three fingers, with the index on its mouth in order to prevent the few drops of urine in the catheter from soiling the clothes, and gently withdrawn; when the point is held over the vessel the finger is removed from the mouth and a few drops always escape from the other end. The introduction of the catheter into the normal urethra is usually painless, with the exception of a slight disagreeable sensation as it passes into the bladder. Its withdrawal often gives somewhat more pain when the circular muscular fibres at the neck of the bladder contract on it and oppose its removal; cessation of traction for a

FIG. 77.—Sims' Sigmoid Catheter.

FIG. 78.—Goodman-Skene's Self-retaining Catheter.

few moments and then gentle, steady traction will usually overcome the obstacle. In irritable, inflamed, or fissured urethræ, the catheter gives more, even decided pain; so also in cystitis when its point strikes the wall of the bladder. If the urine ceases to flow when percussion shows that the bladder is not empty, in all probability the eye of the catheter is choked up by the vesical mucus, which can be removed by passing the mandrin into the catheter.

In some women the vestibule of the vagina presents several little shallow depressions (congenital formations, usually associated with redundancy of the anterior border of the hymen or its remains) which may confuse the practitioner in his search for the meatus, the only opening or irregularity in the normal vestibule. The sharp ring, already spoken of, will prove the distinguishing mark. At times the meatus is situated exactly on the edge of the anterior border of the vaginal orifice, and is pushed slightly within the orifice by the finger, thus escaping from the tip of the catheter and materially increasing the difficulty of its introduction. A loose attachment of the urethra to the symphysis pubis is probably the reason of this displaceability of the meatus.

Cases suffering from a purulent or infectious discharge from the vagina form an exception to the rule of not exposing the patient for any manipulation practicable under the clothes. By means of the finger the infectious substance may be carried to the meatus and thence into the bladder by the catheter, and an acute cystitis be the result. For this rea-

son it is usually advisable to introduce the catheter in lying-in women by sight rather than by touch; for Olshausen, who has investigated this subject, has shown that acute cystitis is not unfrequently produced by the introduction of lochial fluid into the bladder on the catheter. A careful cleansing of the external genitals, and the exposure of the meatus during the catheterization is advisable. The same rule applies, for the same reason, after a perineum operation; and also if the practitioner is not very skilful in finding the meatus, but endangers the union of the rent, in his endeavors to touch that opening.

After the operation for vesico-vaginal fistula it is customary to introduce a self-retaining catheter until the stitches have been removed; this is also frequently done after the secondary operation for lacerated perineum, to prevent the urine from touching the wound, and relieve patient and physician from the annoyance of frequent catheterization. Sims' sigmoid catheter (Fig. 77) is, undoubtedly, the best instrument of the kind, better than the elastic rubber catheters, which are liable to slip out and rapidly become foul. The sigmoid catheter requires to be removed and cleansed every day. It is retained by its peculiar shape, balancing, as it were, in the urethra. A vessel between the thighs of the patient receives the constantly dropping urine. All patients do not bear these self-retaining catheters well, and complaints of vesical pain and tenesmus occasionally require the removal of the instrument and a return to frequent catheterization or spontaneous urination. It is by no means absolutely necessary that the urine should constantly escape after fistula operations (Simon allowed his patients to urinate normally at frequent intervals, and other operators use the ordinary catheter), or that it should be kept from the surface of a freshly united perineum. I have frequently seen perfect union ensue, both after the primary and secondary operation, in cases where the patients urinated at will, and the external genitals were merely washed by a gentle stream of tepid water immediately after each evacuation of the bladder.

A very serviceable instrument is the self-retaining catheter of Goodman, modified by Skene (Fig. 78). It is chiefly used in cases of chronic cystitis, when it is desired to maintain a continuous drain of urine from the bladder. A rubber tube attached to the mouth of the catheter leads the urine into a vessel at the bedside, or a rubber receptacle worn under the clothing. This instrument may be worn for months, while the woman is about her daily avocation.

II. DILATATION OF THE URETHRA.

Although really one of the minor operations of gynecology, the dilatation of the female urethra is discussed in this connection for convenience sake.

The *indications* for the operation are either of a diagnostic nature (as already referred to) or for therapeutical purposes. For diagnosis, the dilatation is performed to permit the introduction of the finger or endo-

scope; for therapeutical purposes, as a means of cure, through distention of the canal alone, and to permit the free introduction and exit of instruments and fluids. Thus, in cases of irritable urethra or bladder, or fissure of the urethra, or after removal of urethral caruncle, or in chronic cystitis, the hyperdistention of the urethral walls affords a very efficient, perhaps certain mode of relief; further, in vesical calculus, dilatation permits the removal of the entire or crushed stone, and in chronic cystitis the free efflux of injected fluid. In the latter condition, besides, the free drain, which may follow thorough dilatation of the urethra for several days, gives at least temporary relief.

For tenesmus and irritable urethra and bladder, a distention to the largest size of Peaslee's dilators will usually suffice, and will occasion comparatively little pain. For the other conditions, the urethra should be dilated to the free admission of the index-finger, an operation always calling for an anesthetic.

When the urethra has been dilated to its full dimensions, the diseased (inflamed or ulcerated) spots may be exposed with the speculum or endoscope (as already described under Examination of the Bladder), and medicinal agents be directly applied to them through the tube.

The digital exploration of the vesical mouths of the ureters, and the practicability and utility of sounding these ducts has already been referred to under Digital Examination.

Operation.—The dilatation of the urethra may be performed either by the finger or by instruments. As a rule, every dilatation must be begun by instruments until the tip of the little finger can be introduced: thus, the ordinary dressing forceps, or Peaslee's or Hanks' or Simon's dilators are introduced, and the urethra is gently stretched to the width of the little finger. Although in apathetic subjects the dilatation may be performed without an anesthetic, it is generally advisable to put the patient at least into the first temporary unconsciousness attending every anesthesia, if the dilatation is to be pushed farther than the width of the little finger.

The patient being anesthetized, and occupying the supine position on the back, the forceps or dilators are gently introduced through the urethra into the bladder and gradual dilatation is performed until the urethra seems sufficiently large to admit the tip of the little finger. Some blood may escape during this process, but usually no visible laceration of the meatus is produced. The tip of the little finger is then engaged in the meatus, and gently pressed forward by a half-pushing, half-boring motion until the constriction at the meatus is passed, often suddenly (with more or less nicking of the border), and the finger passes the slight obstruction at the neck of the bladder, and its tip enters that viscus. Some difficulty is occasionally produced by the flexibility of the little finger and its metacarpal joint, and the loose attachment of the urethra to the pubic arch: in such cases more force, usually of a pushing nature, is required, or the urethra must be supported by the other hand, or the index-finger takes the place of the little finger as a dilator. If it is desired to push the dila-

tation still farther, the little finger is withdrawn, and the index gently forced into the bladder in the same manner, with, of course, more or less laceration of the meatus (generally upward toward the clitoris) proportionate to the dilatability of the canal, the friability of the tissues, and the size of the finger. I have seen quite severe hemorrhage follow this supreme dilatation, which was always speedily arrested by packing the vulvar cleft with cotton-wool and a tight T-bandage. The index is introduced nearly its whole length, and its third joint and one-half of the second then project into the bladder, sufficient for palpation of that organ and its surroundings.

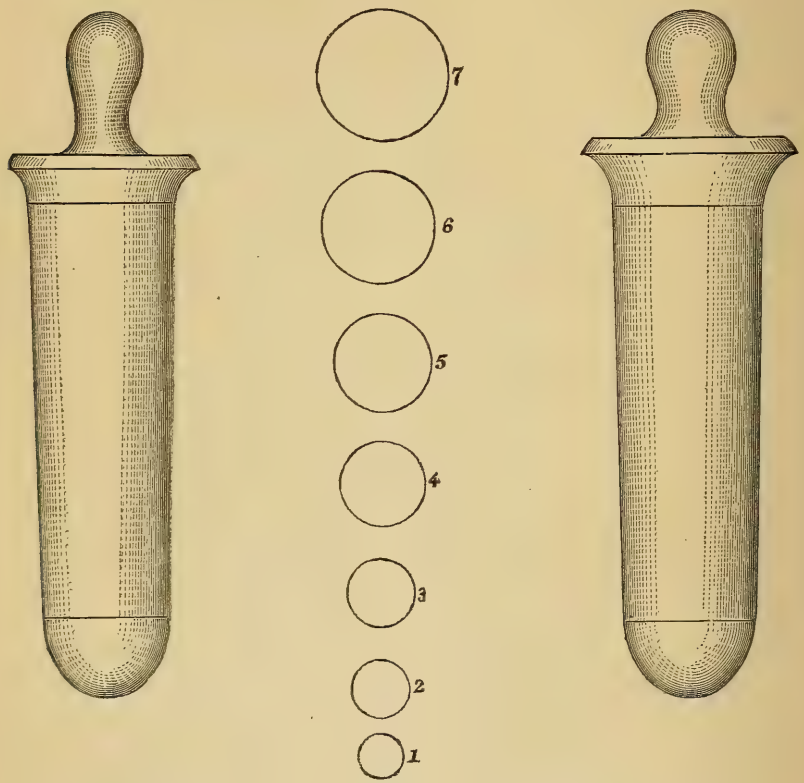


FIG. 79.—Two of Simon's Set of Urethral Dilators (Natural Size), and Scale of Dilatation.

If still greater dilatation is desired, a very small cylindrical speculum may be introduced (as I have done) or a bi- or trivalve rectal speculum employed. But it should be remembered that greater dilatation than the size of the index-finger is more than liable to be followed by permanent incontinence. Occasionally, in large stones or in tumors of the bladder it is necessary to open the urethral canal still more, and it may then be split toward the vagina with knife or scissors to greater or lesser length, only to be immediately united by suture after the removal of the growth. The

points of constriction of the finger are at the neck of the bladder and the meatus ; chiefly, I have found, at the latter.

This operation has been developed into a systematic procedure by the late Professor Gustav Simon, of Heidelberg, who gave explicit directions for its performance and demonstrated its perfect innocuousness (in his hands, at least). His method consists in nicking the upper border of the meatus with the scissors on each side to the depth of $\frac{1}{4}$ ctm., and the lower border once to the depth of $\frac{1}{2}$ ctm. He then introduces his set of hard-rubber specula, guided by a mandrin with a round button, one after the other, until the largest one has been used. The set consists of seven specula, varying between $\frac{3}{4}$ ctm. and 2 ctm. The largest is followed by the index-finger, the corresponding middle finger being introduced into the vagina (whereby the index-finger is enabled to penetrate about one centimetre deeper), and the other hand crowding down the bladder. This dilatation is feasible without the least force in from five to seven minutes, and laceration of the urethra or vestibule is rare, whereas Heath reports to have torn the urethral mucous membrane under the pubic arch in every case of unaided digital dilatation. Simon denies the occurrence of incontinence after this, and even larger, dilatation. Indeed, he claims that in the adult female the urethra may be dilated to the circumference of 6.5 to 7 ctm., and in girls to a circumference of 4.7 to 6.3 ctm., without incontinence. Winckel corroborates Simon's statements as to ease and innocuousness of the dilatation in the above manner, but says that in all his seven cases the incisions were torn deeper, or another tear occurred at the meatus ; the pressure of the speculum arrested all hemorrhage. After the largest dilatation a forceps could be passed into the bladder at the side of the index, which he found impossible after simple digital distention.

Since the patient is generally anesthetized, the rule is to perform this operation at her home or in the hospital. But I have several times undertaken it in a minor degree, with excellent results, in the out-door clinic and at my office, with and without chloroform.

Dangers.—The chief danger resulting from dilatation of the female urethra is the possibility of permanent incontinence. But this will never be observed after the minor degree of dilatation for the little finger, and but rarely after that for the index.

The high figures of Silbermann, who collected forty-eight cases of rapid dilatation with eight instances of permanent incontinence, can scarcely be considered a fair showing, since Simon's and Winckel's results are entirely different. Winckel correctly observes that the operation in these cases must have been performed with improper instruments, and in a brusque manner, not slowly and gradually with Simon's specula, and the bad consequences, therefore, should not be attributed to the method, but to its improper execution. Of recent writers, Emmet is particularly emphatic in warning against this hyper-dilatation, of which he claims he has seen two proofs out of eleven cases in the gaping incontinent urethræ of women who came to him to the Woman's Hospital for relief—a relief which, unfortunately, is not easy to give, as the tone of the flabby canal is

not restorable, and the operation for its constriction is a difficult one. In contradiction to this warning voice is the experience of Noeggerath, who has seen but two cases of incontinence out of seventy-five dilatations; and I myself have, in some fifty instances, seen not even temporary incontinence. In one case of hyper-distention with the index-finger in the bladder in a young girl, urine was passed normally within four hours. But, in view of the difficulty of relieving permanent incontinence, Emmet's caution should certainly be respected, not to practise the dilatation unnecessarily, rudely, or too thoroughly. Whether Emmet's dictum, that the advantage gained does not compensate for the risk, is always correct, remains to be seen. Certainly the *very* small number of cases of permanent incontinence reported cannot as yet be considered as condemning the practice. I have seen one case, indeed, in which permanent retention (which, it is true, had preceded the operation, and for which the latter was performed) persisted after dilatation with the index-finger. Another danger possibly following dilatation is the production of peritonitis. Of this, so far as I know, only one case has been reported (by Etheridge, of Chicago), in a girl in whom peritonitis and fatal typhoid followed a urethral dilatation. The danger of hemorrhage from the lacerations produced need scarcely be mentioned, unless the tear should extend so deeply into the vestibule toward the clitoris as to wound the large plexus of veins and arteries there situated, in which case the hemorrhage might be profuse and require to be arrested by deep sutures and compression.

The recurrence of a chronic pelvic perimetritis or peritonitis after dilatation is certainly possible; therefore, such conditions, if the least tenderness on pressure or decided pain exists, would counterindicate the operation.

Other reaction than some burning in the urethra and vulva, chiefly on micturition, is not usually noticed. The occurrence of vesical catarrh, and of urethritis mentioned by Noeggerath and Winckel, I have not observed. Recognizing the possibility of such an occurrence, I have generally advised the application of cold-water compresses to the vulva for twenty-four hours after the dilatation. Winckel says that the occurrence of cystitis after dilatation cannot be denied, but that irrigation of the bladder will relieve it in a few days, and that the advantages derived from this method of examination by far exceed its dangers.

The *counterindications* to dilatation are such conditions as would be likely to produce permanent incontinence, hemorrhage, or inflammation, viz.: great friability or brittleness of the tissues, varicosity or edema of the vestibule, and acute or subacute pelvic or peritoneal inflammation.

III. INJECTIONS INTO THE BLADDER.

Under this title are included not only the injection into the bladder of medicinal solutions, but also the irrigation or washing out of the viscus for purposes of cleanliness or disinfection.

The *indications* for the introduction of fluid into the bladder are,

therefore, twofold: 1, the washing out of its cavity, the removal of decomposing urine and mucus, of purulent secretions, or inorganic deposits from the urine; and 2, the injection of medicated fluids for the cure of certain pathological conditions. The special indications for the practice are almost invariably the presence of chronic cystitis with its concomitant erosion or ulceration of the mucous lining. As a therapeutic agent the simple irrigation of the bladder with tepid water, generally containing chloride of sodium one drachm to the pint, frequently repeated, will often suffice to cure even obstinate cases of cystitis.

When a patient complains of the well-known symptoms of cystitis (frequent micturition always accompanied by vesical tenesmus and scalding, cloudy, or purulent urine), and these symptoms have existed for some time, weeks or months, internal remedies will generally have been found ineffectual, and the final resort to local treatment becomes imperative. The bladder is, then, usually first washed out with the tepid salt solution, and, if thought necessary, its interior examined by the endoscope through the dilated urethra, and direct application made to any ulcerated spots which may be discovered. In the large majority of cases of chronic cystitis local treatment will be found indispensable to the cure, or even alleviation of the disease.

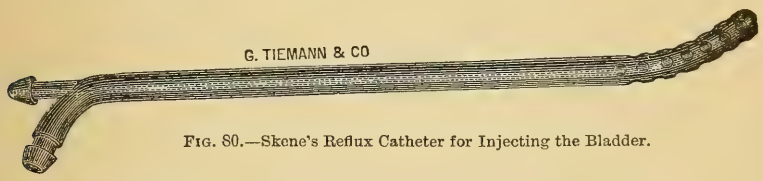


Fig. 80.—Skene's Reflux Catheter for Injecting the Bladder.

Method.—It may seem exceedingly simple to inject fluids into the bladder, when the injection-tube has once been introduced, and so it is. But there are various precautions to be observed as to the kind of tube, force, and quantity of injection, which are by no means unimportant, both with regard to the feelings of the patient and the success of the treatment.

An injection may be made through the ordinary metal or hard-rubber or the elastic catheter. But the large size of the eyes of the ordinary catheter permits folds of the mucous membrane of the bladder to be sucked into them when the fluid is withdrawn, and superficial injury easily results therefrom. A much preferable injection-tube is one with numerous small perforations within an inch or more of the blunt tip. The best instrument is one with a double tube to enable the constant egress of the fluid while the injection is going on. The double catheter of Dr. Skene possesses every requisite, the fluid entering through the slender central tube and escaping through the larger shell; rubber hose is attached to each nozzle. The best means of propelling the fluid is by hydrostatic pressure; therefore, a fountain syringe or irrigator is the instrument to be preferred. The injection should be steady and uniform, not in sudden jerks. A stopcock in the catheter is very convenient to regulate the

amount and rapidity of the injection and escape of the fluid. A hard-rubber catheter is preferable to a metal one, as it is not affected by acids. The sudden injection of the fluid causes intense pain by subjecting the bladder to a rapid distention to which it is not accustomed ; and the quick evacuation of the fluid causes the bladder to contract so rapidly as to wound itself against the end of the catheter. The regulation of the flow by the stopcocks prevents either of these occurrences.

The necessity of avoiding all force in injecting the bladder has already been pointed out. The fluid should be allowed to flow in by its own weight. The quantity to be introduced at each sitting varies greatly with the capability (not capacity) of the bladder, and that quality depends on the duration and severity of the disease, and the consequent irritability of the organ. In some cases, I have allowed a quart of water to flow gently into the bladder before pain or desire to micturate was complained of ; in others, but a pint was tolerated, and in others again but a few ounces. If the double-current catheter is used the water can generally be allowed to flow *through* the bladder until it is perfectly cleansed, without giving appreciable pain. Winckel proportions the amount to be injected to the age of the patient and the size of the bladder, $\frac{1}{4}$—$\frac{1}{2}$—1 litre, several times daily. Skene lays down the following rule : 1. Inject only one ounce at a time, repeating this, if necessary, three or four times at the same sitting. 2. Inject as slowly as possible, avoiding all sudden jerking.

How the bladder can be thoroughly washed out by injecting only an ounce of fluid each time I cannot understand, unless many more separate ounces be injected than Skene permits ; nor can I see the necessity for such excessive precaution as to the quantity so long as a double catheter is used. These cleansing injections or irrigations of the bladder should always immediately precede the injection of a more or less highly medicated fluid. In themselves the cleansing injections are an exceedingly valuable therapeutical agent in chronic cystitis. They may be continued once or several times daily for weeks, and finally effect a cure. Pure water, however, should not be used, as it has been found irritating to the bladder. The addition of chloride of sodium one drachm, or chlorate of potash one-half drachm, to the pint makes the best cleansing fluid ; if there be ulceration or suppuration, a strained decoction of flaxseed or lime-water, or better still, a one per cent. solution of carbolic acid or one-tenth per cent. solution of salicylic acid may be used. If the urine is alkaline or offensive, two minims of dilute nitro-muriatic acid should be added to the ounce of water ; if it is acid, as many grains of bicarbonate of soda to the ounce. By injecting solutions of chloride of sodium (4 : 1,000, increasing daily by 15 grains) three times daily for twenty-five minutes each time, Lemaistre-Florian claims to have cured chronic cystitis in twenty-one days. The temperature of the water should always be from 90° to 100° F. If these cleansing injections, one or all, do not relieve the case, positively astringent or caustic applications should be made. The two great precautions to be observed in using these therapeutic injections are to inject only a small quantity at a time, from five drops to one ounce, and never to use solu-

tions strong enough to give actual pain. Winckel follows the irrigation with salicylic solution (if necessary) by injecting a solution of nitrate of silver of the strength of 1—2—3 parts in 500, or of tannin gr. v. to xv. to ʒ iv., continuing this for weeks. Braxton Hicks uses for acute cystitis an irrigation of one litre of acidulated water (nitro-muriatic acid 2 drops to 1 ounce) and then injects a solution of morphine 1—2 grains to the ounce, causing this to be retained as long as possible for purpose of absorption. When the acute symptoms have subsided, solutions of tannin, or 3 to 4 drops of the tincture of the chloride of iron to 1 ounce are injected. Skene recommends for pain, injections of chloral hydrate, 10 to 15 grains to 1 ounce of water. As astringent and alterative injections Skene speaks of the silver-nitrate, sulphate of zinc, tannic acid, and acetate of lead, 1—2 grains to the ounce, increasing the strength, if necessary, but not sufficient to give pain. Infusion of hydrastis Canadensis is also useful. In obstinate cases, Skene speaks highly of a strong solution of nitrate of silver, 20 grains to the ounce, injecting only 5 to 10 drops at a time. To insure the injection of no greater quantity an instillation tube of glass, with small rubber bulb attached, is used by Skene, or a No. 1 or 2 elastic catheter with a hypodermic syringe attached may be used, this small catheter being introduced through the larger one which has first been used to wash out the bladder; when 5 to 10 drops have been injected, the small catheter is removed and a little water injected through the larger tube, which dilutes the caustic and prevents too deep action. The injection of normal urine in cystitis is deprecated by Skene. Iodoform (by insufflation, I suppose) has also been recommended. A solution of iodoform and chloral in water (ʒ ss. : 15 grains to the ounce) would seem to me a very useful injection. If the urethra is so tender as to render the introduction of the catheter difficult without anesthesia, Hicks and Skene recommend to force the injection from a larger syringe into the urethra and bladder by inserting the point of the syringe only part way into the urethra or simply holding it against the meatus; the stream is then forced into the bladder, and the necessity for anesthesia may be avoided.

IV. APPLICATION OF MEDICINAL AGENTS TO THE VAGINA AND CERVIX.

Medicinal agents may be applied to the mucous membrane of the vagina, intravaginal portion of the cervix and external os uteri, by various methods, as in *solution*, by vaginal injections, through specula, and on wads of cotton; as *powders*, through specula, on cotton and by insufflation; as *ointments*, through specula, and by a syringe; in *suppositories* and *capsules*, through tubes.

a. Vaginal Injections.

The application of water, pure or medicated, to the walls of the vagina and cervical portion of the uterus, in health and disease, by means of syringes of various patterns, has been in use since time immemorial. The

ease with which such applications are made has rendered them popular far beyond the deserts which the merely temporary contact of the injection fluid with the vaginal walls entitles them to. It is only within recent years that the true value of many of these injections has been recognized to consist in their thermic qualities. The necessity for using this method of local medication, in one form or another, in the majority of gynecological cases, calls for a detailed description of the instruments employed, the constitution of the fluid, the indications and utility, counterindications, and dangers of vaginal injections.

Vaginal Injection Apparatuses, and their Use.

The number of contrivances for the introduction of fluids into the vagina is very great, too great, indeed, for description, even if they were all practically useful and safe. I shall mention only the few which have stood the test of experience, and which answer every purpose of utility, convenience, and economy.

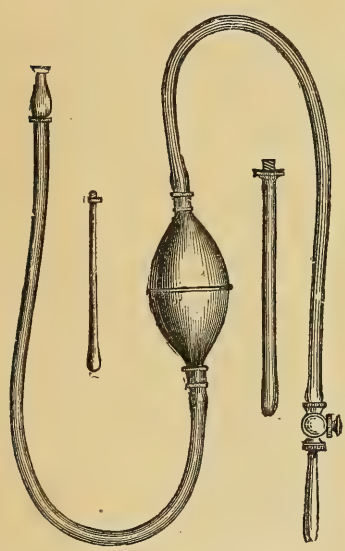


Fig. 81.—Davidson's Vaginal Syringe.

The old, time-honored, metal piston-syringe of the Europeans is, happily, a thing of the past, with us, at least, and is mentioned only to be condemned.

The apparatuses differ in construction in one essential particular, viz., in the propulsive agent by which the fluid is forced from the syringe, it being in the one variety the muscular force of the patient herself, or an attendant; in the other variety, simple hydraulic pressure; in the third, suction. Of the instruments operated by the muscular force of the patient or attendant only one need be mentioned, the familiar Davidson's syringe, which is in the possession of every woman in the land. If proper care is taken of it, especially if it be not kept in too dry a place, it will be found very durable. Like all rubber, however, it is liable to crack after a time, and if this accident happens to the bulb, the syringe becomes useless and irreparable. If only one of the valves shrinks, it may be replaced by a new one at the instrument-maker's or druggist's; and if the rubber tube wears through at the junction with bulb or attachments, as it often does, the cracked portion may be cut off and the tube fastened again by tightly wound cord, when the syringe will act as well as ever. An objection to the instrument, as still sold, is the presence of a central aperture in the vaginal nozzle, to the danger of which I shall refer more at length later on.

The one great objection to the Davidson, no matter how excellently constructed, is that the force required to use it for any period of time ex-

hausts the patient, or necessitates the aid of an attendant. To obviate this, a siphon arrangement has been introduced, the credit of which has been given to Scanzoni. An unpleasant feature of this contrivance is that the air has to be sucked out of, and the water into, the tube by applying the mouth to the vaginal end; this may be avoided by allowing the water to run by gravitation into the tube, or laying bell, tube and all, with open stopcock, into the water before using it; or the tube may be supplied with a rubber bulb, by compressing which the air is expelled. The flexion of the rubber tubing over the border of the vessel may be obviated by attaching a spout to the vessel, or making the curve of the tube of inflexible material, as shown in the cut (Fig. 82). When the stream has once been

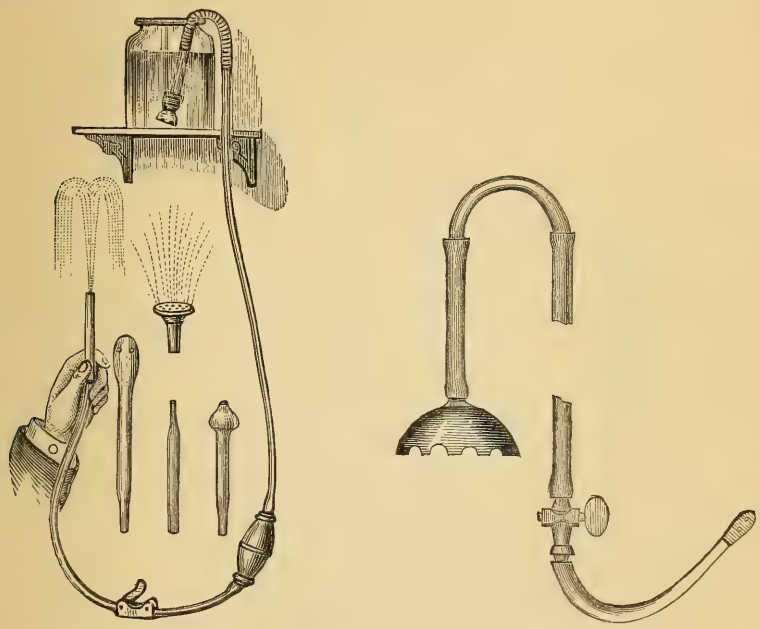


Fig. 82.—Siphon Vaginal Syringe.

directed through the tubing it will continue to flow until the vessel is empty. I have mentioned this contrivance because it really is practical, and may prove serviceable in emergencies. But I can hardly conceive of an occasion when the much more convenient apparatus, now to be described, cannot be obtained or constructed with the same materials needed for the siphon. The ordinary surgical irrigator is certainly the perfection of a vaginal syringe, and combines convenience, efficiency, and safety. It may be made as economical as possible by using a plain tin pail, with ordinary rubber tubing and glass nozzle, or it may be elegantly painted and decorated, and be furnished with an unusually long tube, stopcock, and hard-rubber nozzle. I have had them made by Mr. Philip H. Schmidt, instrument-maker, of No. 1311 Broadway, for a number of years, with pails of different sizes, holding from one to eight quarts, at prices varying

between $1.50 and $4.50, according to size, length of tubing, and quality of hard-rubber work. For dispensary practice he has even been able to furnish them for $1.25. All these pails are neatly painted and japanned. The nozzle of the cheap kind is glass, those of the better varieties of hard-rubber, as well as the stopcock. The nozzle has no central aperture. The tubing is attached to the side of the pail near the bottom, and not to the latter, so that the pail can both be stood on an elevation or suspended by a pole near its upper border. In recommending a syringe for therapeutical vaginal injections I have for several years given this irrigator decided preference. Its only objection is its importability; for cases, therefore, where the patient is likely to need the instrument while travelling, I recommend the very compact and portable fountain syringe, which consists of a rubber bag, holding from one to four quarts (according to number of syringe), with the various attachments of hard rubber and glass for vaginal, rectal, aural, nasal, ophthalmic, and other douches. Some of these rubber bags are so contrived as to permit of their apertures being securely closed, when the bag can be used as a hot or cold water, or ice bag, at times a great convenience.

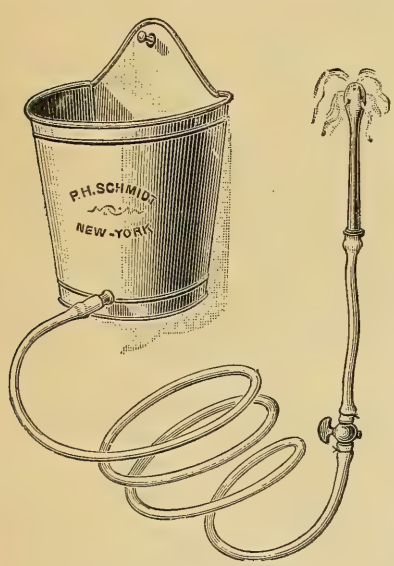


Fig. 83.—Vaginal Irrigator, with Tube.

With these few simple apparatuses my list of vaginal syringes closes. The complicated and expensive instruments, with elegant Greek names, of Braun, Eguisier, Beigel, Woodward, etc., all act more or less by manual force, and have no advantage whatever over the Davidson; they are therefore not worthy of recommendation or description.

Method of Using Vaginal Injections.—It is scarcely necessary to describe the manner of using the ordinary vaginal injections practised daily, or as often as the individual peculiarities of each case may require, by every woman who has any regard for her personal cleanliness. It is for this purpose that the Davidson syringe occupies so prominent a place in every household, unless its place be supplied by a hose and perforated tube attached to the water-closet or the bath-tub faucets; or a real French *bidet* with ascending vaginal tube and single or double water compartment is used. The latter contrivance is certainly very convenient, since its height enables the lady to sit comfortably on it as she would on a chair, and the fatiguing crouching on the ordinary chamber-vessel, and attending crowding down the uterus, is thereby avoided. The vaginal tube of the bidet may be connected with the wash-bowl faucets, by a double tube, so as to allow the water from the hot and cold faucets to mingle and be regulated at will.

For ordinary cleansing purposes, the erect, sitting, or crouching position is admissible, but not advisable. But for the administration of *therapeutic* vaginal injections the *dorsal recumbent position with elevated hips* is the only one to be recommended or allowed. Whatever the injections may be used for, whether as astringents, hemostatics or absorbents, they can only exert their full benefit when the patient is lying down. In the erect or crouching position (especially the latter), the abdominal and pelvic viscera are naturally crowded down, the vagina is shortened, and the cervix uteri forced toward the vaginal orifice. Obviously the injection fluid will then fail to reach every portion of the rugous and collapsed vagina, the lips of the external os will be separated, and the fluid given free admission to the uterine cavity, and any displacement of the uterus and ovaries, and accompanying hyperemia (for the reduction of which latter the injections may have been ordered) will be increased. Besides, the immediate escape of the fluid to a great extent invalidates the benefit to be expected from a longer contact between it and the vaginal surface.

Therefore, whether the apparatus used be the Davidson syringe, with its interrupted current, or the steady stream from the irrigator, the patient should occupy the recumbent position on her back, with elevated hips; in this position the abdominal viscera gravitate toward the diaphragm, the abnormally stretched uterine ligaments become relaxed, and the vagina is readily distended by the injected fluid, a portion of which will remain in the vaginal pouch, and in contact with the cervix until the patient resumes the erect position. The imperative necessity for the adoption of this dorsal position during all species of vaginal injections has not been clearly recognized and sufficiently insisted upon until quite recently, and it is chiefly to Emmet that the credit is due for its popularization, so far as the systematic injection of *hot* water is concerned. Really popular, it is safe to say, the position has not become even yet; and I am confident of not overstating the fact when I say that the large majority of general practitioners are still in the habit of recommending vaginal injections, medicated or not, without the slightest direction either to the manner or position in which they should be used, or the quantity to be injected. The almost uniform result is that the patient hastens over the disagreeable treatment as much as possible, and uses the injection in the habitual crouching or erect position, taking as little fluid, and cutting the whole process as short as possible, and consequently deriving but little benefit. Physicians should, therefore, be careful to impress upon their patients not only the exact proportions and the quantity of the solution to be injected, but also the temperature of the fluid, the force and duration of each injection, the manner of introducing the tube, the position to be occupied during the process, and the length of time this treatment is to be continued. Attention to all these details will insure the best results, and the avoidance of accidents and disappointment.

The disadvantage of the recumbent position during vaginal irrigation is the difficulty of combining comfort and a proper receptacle for the in-

jection fluid as it leaves the vagina. If the Davidson syringe with its short tubes is used, another difficulty is added, viz.: the placing of the vessel holding the injection fluid conveniently to the vulva and hand of the patient. This difficulty may be obviated by the assistance of an attendant, but it is not always convenient or possible to secure such a one. Besides, in both systems of syringes, the injection of a large quantity of fluid requires the emptying of the receptacle once or oftener, a duty also devolving on an attendant. But this place of an attendant can be supplied by any one, even by a young girl, and there will rarely be a family in which such assistance cannot be obtained, if necessary. If a large-sized irrigator, and a chamber vessel or large bedpan be used, or one of the devices now to be described is employed, the services of an attendant can usually be dispensed with, the patient herself emptying the receptacle when the injection is completed.

To overcome this difficulty various plans have been suggested and contrivances devised. I have found an ordinary large chamber-vessel placed under the nates of the patient, her back and head being properly supported by pillows, to answer admirably. Of course, a little ingenuity is required to place the vessel so that it does not sink obliquely into the mattress, and allow the water to escape on one side ; and also to place the pillows comfortably. A shovel bedpan, as a rule, does not answer well, because its bevelled edge is liable to sink into the mattress, and its capacity is too small. The old-fashioned round bedpans are greatly preferable in this respect. Dr. Emmet has the round bedpans made of copper, with a small outlet-pipe, over which a rubber tube is slipped to conduct the water from the pan. If the bed or couch is very soft, a board or hard cushion should be placed under the receptacle on which the patient lies. A round rubber air-cushion, fully inflated, with closed central hollow, will do very well, the water being caught in the large central opening ; if an escape-tube at the side is attached, as I have seen them, every requisite is supplied. A very simple and efficient substitute for a receptacle is furnished by a large rubber cloth properly arranged ; this is hung over the edge of the bed, the patient is placed on it with her hips close to the edge, and each foot on a chair close to the bed ; the mattress at the edge is pressed downward, and a crease leading over the edge made in the rubber sheet ; down this, water escaping from the vagina flows into a bucket on the floor. Of course, again, care must be taken not to let other creases run up on the bed, and the vulva must be at the very extreme edge of the bed, or else accidents will happen, and patients will be disgusted with the method when they have only their own awkwardness to blame. Or, two chairs may be placed close together, and the patient lie on them so as to bring the vulva directly over the space between them, her legs resting on a third chair, and the upper portion of her body lying on the side of the bed. The water will then trickle from the vagina into a pan placed between the two chairs.

Noeggerath and Lord have employed the ordinary bedpan with an escape-pipe attached. I have had made a very convenient, and but mod-

erately expensive flat round pan, of zinc, which with its supplying and receiving vessel is shown in the accompanying diagram. With these devices it is important that the surface on which the vessel rests should be moderately hard and unyielding. If these methods do not answer, the injections, being generally given night and morning, may be used in a long bath-tub, the patient's hips being raised on a rubber cushion. Various gynecologists have endeavored to dispense with all these paraphernalia and difficulties by constructing injection-tubes with broad rubber cups or plates to fit over the vulva, and efferent tubes to conduct the water from the vagina. Those of Mathieu-Kisch, Frank P. Foster, and Scarff are the only ones known to me. That of Foster, having the largest and best fitting cup, appears to me the most useful. I have not used it, but Dr. Emmet testifies to the tight fit of the cup and the entire absence of escape of fluid except through the efferent tube. Another advantage of these instruments with escape-tubes is the protection of the vulva and perineum from the injection fluid which, as is chiefly the case when injections of *hot* water are used, may at first, until the parts become toughened, cause considerable pain when it escapes. When such hot injections are used it is always advisable to protect the perineum by a large sponge or napkin wet in cooler water. It should be remembered that water of a temperature which is perfectly comfortable to the comparatively insensitive vaginal mucous membrane becomes scalding when it touches the highly innervated external skin.

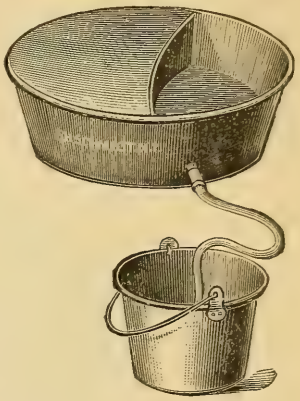


FIG. 84.—Mundé's Irrigator—Pan.

The quantity of fluid to be injected at each sitting varies with the constitution of the fluid and the object in view. If merely cleansing injections are intended, a pint or quart will suffice. If disinfection is desired besides, the quantity should be larger and the flow should continue until the efflux is free from all impurities or odor. If an astringent effect is designed, a smaller quantity, a pint or less, will suffice, but it should be retained for some little time, five to fifteen minutes. If the injection is to act as a hemostatic, if it be a medicated fluid, only a small quantity is needed and it should be retained for fifteen minutes or longer ; if it be designed to act through its thermic qualities, the quantity should be large, the temperature—hot or cold—as high or low as can be borne, and the force considerable. If a stimulant or absorbing effect be intended, the quantity of fluid—always *hot* now—should be still larger, the force and the length of time of each sitting even greater. When a tonic influence is intended, the quantity of fluids should not be so large nor the temperature so high, but the force may still be considerable.

In accordance with the force desired the irrigator is to be elevated or depressed.

The frequency with which vaginal injections should be given varies

from once to three or four times or more a day, according to the strength of the fluid and the effect desired.

It is evident that no special rules can be given in these general terms either for the exact quantity of the injection fluid, the force of the injection, or the length of each sitting; all these must be determined by the peculiarities of each individual case and by the experience of the practitioner.

I have already stated that every vaginal injection, with the sole exception of the ordinary cleansing injection commonly used during health, should be taken in the dorsal recumbent position. This rule is especially applicable to the injections of water at a high temperature, the so-called "vaginal baths" of the New York Woman's Hospital, introduced into gynecological practice as a systematic therapeutic agent by Thomas Addis Emmet some twenty years ago or more. Although he has repeatedly de-

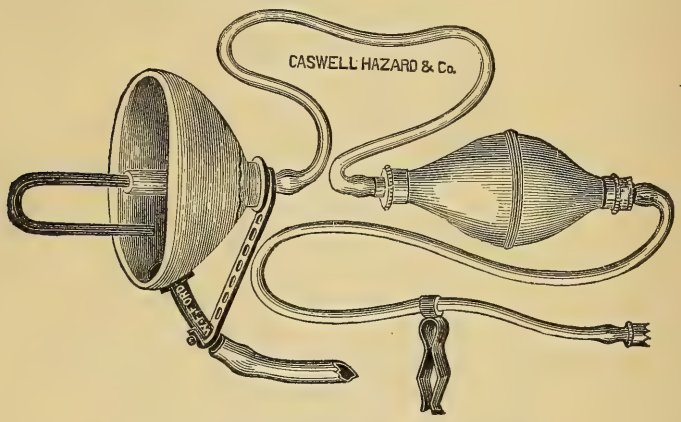


FIG. 85.—Foster's Apparatus for Vaginal Irrigation.

scribed the method and therapeutic rationale of these *copious, hot* water injections, and their method and value are familiar to all the pupils of Emmet and the institution in which he has officiated and taught so ably for many years, and to many specialists, neither the details nor the rationale of the method have been properly understood by the majority of the profession. This was certainly the case until the publication of Emmet's book less than three years ago; since then, I daresay, his peculiar methods have been studied by many who formerly had scarcely a suspicion of the details of modern gynecological practice. Notwithstanding, as this treatise is written for the young practitioner and embryo gynecologist, I will run the risk of being diffuse, and again point out the cardinal differences between the old methods of giving vaginal injections and the new system as employed chiefly for the introduction of *hot* water into the vagina. Formerly the injections were taken in the erect, sitting, or crouching position, the temperature and quantity of injection-fluid were not at all or indistinctly prescribed, and the length of each sitting not specified. The disadvantages of injections thus administered have already been enumerated.

The present method is as follows: The patient occupies the dorsal recumbent position, with elevated hips and depressed shoulders, lying on one of the various contrivances described above; the outlet of the vagina should be higher than its vault, so that the canal is always distended by the fluid. The water should be as hot as can be borne, beginning with 100° to 105° F., and increasing a degree or more daily until 115° to 120° F. is reached. It is not necessary to exceed the latter temperature. The vessel containing the hot water should be suspended at least two feet above the couch of the patient, higher if more force is desired. The water is allowed to escape from the nozzle before introducing it, so as to expel the air. The nozzle may be dipped in cool water for a moment, if the injection-fluid be very hot, before passing it through the sensitive vulvar opening into the vagina. The vaginal tube should be passed along the posterior wall of the vagina into the posterior pouch; if this is not done, its point may be introduced directly into the external os and the uterine cavity injected, thus giving rise to severe or dangerous uterine colic. All this can be done by a patient of average intelligence and determination; a nurse, of course, is a help, but not a necessity. A *hot* vaginal bath, when given as a therapeutical measure, should be taken at least twice a day, and a quantity of water used each time, which will require at least twenty minutes to escape from the irrigator; the latter will thus require refilling several times. These injections, in order to prove of benefit, should be continued regularly, with the exception of the menstrual periods, for months, and even several years.

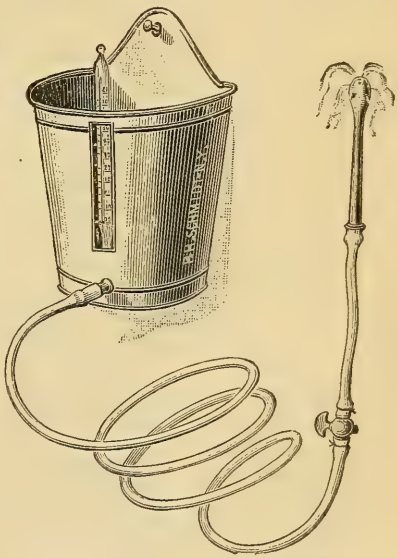


Fig. 86.—Mundé's Irrigator with Thermometer.

I have had constructed an irrigator, with a thick glass thermometer inserted in a slot in the side, open inside and outside, so that the temperature of the douche can be controlled at a glance by the patient or nurse (Fig. 86).

The influence of gravitation and the relief of venous congestion aimed at by the dorsal position with elevated hips is attained to a still greater degree in the knee-chest position. This position may, therefore, be adopted in aggravated cases when the fullest possible effect from the hot injections is desired. Its disadvantages are three-fold, viz.: the impossibility of patients, particularly such as may most require this treatment, remaining sufficiently long in the uncomfortable position, the difficulty of keeping the patient dry, and the scalding of the exceedingly sensitive vestibule and clitoris by the escaping hot water. The first objection is irremediable.

The second and third can be met by using a funnel-shaped apparatus with rubber-tube attached to the smaller end, or the double-current contrivance of Dr. Foster. In cases of obstinate leucorrhea, particularly of infectious character, this same knee-chest position is admirably adapted for the introduction by means of a syringe into the vagina of medicated fluids, which, in consequence of the distention of the vagina in this position, reach every fold and nook of the canal, and, being retained each time as long as the patient can bear the posture, exert a more permanent beneficial influence.

The chief points to be impressed on the patients in using these hot vaginal injections are, therefore: 1. Recumbent, or knee-chest position. 2. Water as hot as can be borne without distress. 3. Duration of each sitting not less than twenty minutes. 4. At least two sittings a day. 5. Introduction of the vaginal tube along the posterior wall. 6. Perseverance for months and years.

In his book Dr. Emmet expresses decided preference for the interrupted stream of a Davidson syringe over the constant current of the irrigator in all cases where he desires the stimulant and absorbent effects of the hot douche. That he is right in this view will not be disputed. But the excellent results which he justly claims for the hot douche in the Woman's Hospital patients have been obtained by the hot *constant* current, the irrigator being the apparatus used in the hospital. Very few patients will be found strong and willing enough to compress the bulb of a Davidson syringe for twenty minutes, and even the nurse is not to be envied to whom this task is delegated. Any one who has worked the air-bulb of a Paquelin thermo-cautery during an operation will appreciate the correctness of this observation. Only in hospitals and with wealthy patients, with nurses at their disposal, will it be possible to insist upon the interrupted stream. I am confident that the constant current, if administered by the rules above given, will answer every reasonable expectation and meet with the hearty concurrence of the patients. Numerous cases of pelvic cellulitis, ovaritis, and areolar hyperplasia have proved to me, beyond the shadow of a doubt, the value of the hot constant current.

Before closing this section I wish to refer again to the construction of the vaginal tube in all forms of syringes. All tubes should be of hard rubber. The bulbous expansion of the tube should not be so large as to be difficult of introduction in virgins. The tube need not be curved. It should be sufficiently long to reach to the posterior vaginal pouch, about five inches. But above all, its olive-shaped tip should not possess a central perforation. The holes should all surround the tip, but the centre be imperforate. If the tube already in possession of the patient have this central aperture, it should be plugged with wood; or, if the tube be of the old variety and of malleable metal, it should be hammered up. That this anxiety on my part, concerning this central aperture, is not fancied has repeatedly been demonstrated of recent years to myself and others.

Many women possess lacerated cervices, or suffer from endotrachelitis

and the external os gapes, or the uterus is low in the pelvis, and its external os points directly in the axis of the vaginal outlet. How easy is it for a woman to pass the point of the tube directly into the external os and force a stream of water or medicated fluid (particularly from a Davidson or other interrupted current syringe) straight into the uterine cavity, and perhaps through the Fallopian tubes. The danger from shock of forcibly distending the unimpregnated uterine cavity by sudden injection of fluid has deterred the majority of gynecologists from using therapeutic intra-uterine injections, irrespective of the possibility of the fluid's passing through the tubes and exciting peritonitis. The nature of the fluid is not absolutely material, for even water or glycerine has produced dangerous symptoms. It is therefore evidently of the highest importance to avoid this accident, which may occur at any injection with an improper tube. Until within a few years I had quite a number of cases of uterine colic, diffuse abdominal pain and tenderness, febrile reaction, reported to me by patients for whom I had directed simple vaginal injections of mild astringent solutions and even plain water. The symptoms came on immediately after or during the injection. I noticed that these cases appeared to be chiefly such as had lacerated, gaping cervices, and the true solution of the mystery occurred to me. Since using nozzles without a central aperture, I have had no more accidents referable to involuntary intra-uterine injections. Since 1875, Drs. More Madden, of Dublin, Paddock, of Nashville, and Simmons, of Yokohama, have reported cases of severe collapse, and even peritonitis, following simple vaginal injections; and Dr. Petit, of Little Rock, Ark., relates three cases of death undoubtedly due to the same cause. Späth, of Vienna, also had a fatal result after the injection of a solution of acetate of lead; the post-mortem revealed the sulphide of lead on the ovaries.

The instrument-makers are difficult to move from their beaten path. It was only after repeated directions that I succeeded in inducing mine to conform with my wishes regarding the closure of the central aperture. Physicians will do well to insist that the tip of every vaginal tube furnished them or their patients shall possess the regulation shape of an olive, or at least a bulbous expansion with a certain number of openings around the crown of the bulb, but none at the very tip. Slender, pointed vaginal tubes with central aperture should be utterly condemned.

Composition of Vaginal Injections.—The injections used for cleansing may consist of simple tepid water or of suds of castile or tar or glycerine soap, or a weak solution of carbolic acid (1 : 200), permanganate of potash (only enough to give the water a light pink color); or bicarbonate or borate of soda may be used, if the vaginal secretion is very acid. Injections of cold water should not be used habitually, unless as a therapeutic agent under medical direction, in relaxed and enfeebled conditions of the pelvic organs.

Injections for therapeutic purposes consist either of pure water, in which case they are either *hot* or *cold*, and act wholly by their thermic properties, and by the shock exerted by the force which propels them; or

of solutions of medicinal agents. The thermic influence of vaginal injections decidedly exceeds that of the ordinary mild medicated injections, the mildness of which is regulated to a great extent by their necessary contact with the external genitals as they escape. A vastly greater effect is exerted by a very hot or a very cold injection than could result from any medicated solution of justifiable strength. The exact temperature of the water used for injection is a matter of importance. Between 35° and 55° F. the water may be considered *cold*, between 55° and 70° *cool*, between 70° and 85° *tepid*, between 85° and 100° *warm*, and above 100° *hot*. When directing the temperature of a vaginal injection it is well to specify the exact degree at which the injection should be begun, and the ratio at which the temperature is to be increased or diminished.

Cold vaginal injections, formerly in universal use, are now but rarely employed, except in cases of postpartum and other hemorrhage. When I say that they are but rarely employed, I mean by direction of the gynecologist. Without such direction I am sure they are employed in many instances where they should not be, and where they do either no good or actual harm. Thus, in congestions and inflammations of the pelvic organs, cold water injections are doubtless still recommended by physicians of the old school, to whom the more rational teachings of the present day are unknown or unpalatable.

Formerly, cold and ice water was employed in all cases where contraction was desired, and tepid water injections were then habitually recommended. Hot water was entirely disregarded as a therapeutic agent in uterine disease. It is only within a few years that the profession have gradually become aroused to the value of this agent; but once aroused, the revulsion in this particular has been marked, especially in this country. While the Germáns and English have recognized the value of hot water as a styptic, chiefly in postpartum hemorrhage, the American gynecologists have introduced it into their special practice. Where formerly cold was employed, heat is now used and attains the same object with more certainty and permanence, and with less discomfort to the patient. The rational and therapeutic application of hot water, as now employed in uterine disease, will be considered under the head of Indications.

Tepid injections, so generally recommended and inadvertently used by the patients in place of the hot injections directed, have no positive therapeutic effect whatever; they act merely as a warm bath does on the body, by cleansing and soothing the surface, and removing the secretions.

The list and variety of medicated vaginal injections is large. The medicinal agents employed in this manner in solution belong either to the class of disinfectants, astringents, alteratives (promoters of absorption) emollients, narcotics.

The *disinfectants* in ordinary use and their proportions are: corrosive sublimate (1 to 1,000 or 2,000), carbolic acid (½—1 to 100), thymol (1 to 1,000), permanganate of potash (1 to 1,000), liquor sodæ chlorinatæ, Labarraque's solution (1 to 2), chlorine water (1 to 2), salicylic acid (1 to 1,000 hot water), sulphite of soda (1 to 200).

The formula used in the Maternity Hospital, New York, for a disinfectant solution of thymol, is as follows:

℞. Thymol..... ℥ j.
Glycerinæ..... ℥ j.
Alcoholis..... ℥ viij.
Aquæ, q. s.....ad Oj.
M. Sig.—Sol. thymol, ℥ j. to Oj.

Of this sufficient is poured into warm water to give it a distinct odor of thymol, and then injected. This is an excellent and agreeable addition to water for washing the hands after examination, and in no wise affects the skin, as carbolic acid solutions do.

There is comparatively little difference in the disinfectant properties of these various preparations; if used in sufficient quantity and strength they all answer their purpose. Formerly the most popular for vaginal injections were the carbolic acid, thymol, and permanganate of potash solutions; certain gynecologists prefer the chlorine water, and others the salicylic, such preference being usually merely the result of habit or a matter of taste. One point of preference of the permanganate of potash solution is its oxygenation of all dead substance and its change from violet red to a brown color thereby; when all effete matter is removed, the fluid escapes in its original violet color. The sulphite of soda solution is specially adapted to cases where the presence of vegetable fungi on the vaginal mucous membrane is the cause or maintainer of a secretion. The compound sold as bromo-chloralum is also an excellent disinfectant and astringent, being used for the former purpose in the proportion of 1 to 50 or 100, for the latter 1 to 10 or 20 parts of water. Another combination of various chlorides (zinc, magnesium, potash, etc.), known as Platt's chlorides, has been used by me for several years for the same purposes, and is a very powerful agent. As a disinfectant I use half a pint of the solution to one gallon of water, perfuming it if it is to be used in the water-closet or in vessels, with an ounce of the spirit of sassafras. As an astringent injection 1 part to 50, as a caustic equal parts of the solution and water are about the proper proportions. Undoubtedly the most efficient disinfectant, because the most powerful germicide, is the corrosive sublimate. The danger of mercurial toxemia should, however, always be borne in mind when using it. In all disinfectant applications it is important that the stream be continued until it returns perfectly free of odor and débris. The irrigator, therefore, is the most convenient and practical apparatus for their administration.

One of the best *astringents* is cold, or rather ice water. Its effects can be attained either through the strong general or local shock when its application is but momentary, or through the permanent contraction of the blood-vessels when the contact is continuous. The objections to its use as an astringent are the unpleasant shock and chill it gives to the patient, and the necessity for its prolonged use, since a blood-vessel contracted by

cold expands to a greater calibre unless the inevitable reaction is postponed as long as practicable; if used for congestion or hemorrhage, therefore, cold must be applied continuously until permanent contraction is obtained or a clot forms in the bleeding vessel. The contractile effect of *hot* water was at first thought to be more permanent, and the unpleasant shock and reaction of cold applications are avoided. Hot water was, therefore, to be preferred as an astringent and styptic to cold water. More recent observations have shown, however (as is also my experience), that while hot water is an efficient hemostatic for the moment, its effect is but evanescent, and that the hemorrhage is very liable to recur in a short time; as a hemostatic, therefore, cold is more reliable; as a remedial agent in local congestion, where it must be frequently repeated, heat, however, is preferable. If the influence of medicinal astringents be desired in addition to that of heat, the last pint or two of a hot injection may be medicated; and this is the best method of administering these remedies.

The medicinal astringents used for vaginal injections are of both mineral and vegetable origin. The minerals are: alum, the sulphates of zinc and copper; the nitrates of silver and aluminium, the persulphate of iron; the tincture of the chloride of iron; the permanganate and chlorate of potash; the acetate of lead, the chloride of zinc. The vegetable astringents are chiefly such as contain tannic acid: pure tannic acid, decoctions of oak bark, cinchona bark, nutgalls, willow bark; claret wine, vinegar, pyroligneous acid. The strength of the solutions of the zinc, alum, silver, copper, lead, and iron salts, is generally one to two per cent. The permanganate of potash will require to be used at the strength of 1 to 400, at least, if any effect is to be produced as an astringent. The objection to it is the stains produced by it on the linen, an objection quite as valid as regards the solution of silver-nitrate, iron, and tannin, all of which make almost indelible spots. The tannin is used in proportions of 4—5 to 100 parts. If applied early, oxalic acid will remove the stains of tannin. Of the various decoctions of barks containing tannin mentioned, the proportion used is generally one ounce of powdered bark to one quart of water, keeping the amount of water always the same until the active principles of the bark are thoroughly extracted; after being strained, the decoction is ready for use, and may be bottled and put away indefinitely. A vegetable astringent which I have used with good results in vaginal leucorrhea, chiefly of the subacute type (vaginitis), is the fluid extract of hydrastis Canadensis, ½ to 1 ounce to the pint. Astringent injections should be used cool, perhaps even cold, if the patient bears such a temperature well. It is an excellent rule to wash out the vagina with tepid water, or with a weak disinfectant before introducing the astringent solution; or the mucus may be removed by a mild injection of caustic potash or soda (1—2 to 1,000). If the solutions are mild, and the salts contained in them do not exert a corrosive action on metal or rubber, they may be injected with the ordinary metal and rubber syringes and irrigators. If they are corrosive (as the nitrate of silver, iron, permanganate of potash), a large straight glass syringe should be used. The nitrate of silver is but rarely employed

as an injection, because the quantity necessary for an injection would render its habitual use rather expensive, and because it has been found that more good is done by the application through a speculum of a stronger solution than would be advisable as an injection by the patient herself.

A combination of astringents often acts much better than one alone, and the article should occasionally be changed. The addition of carbolic acid (1 to 100) to mineral astringent injections often proves beneficial, particularly if there is a subacute vaginitis present. A combination frequently used by me in cases of vulvo-vaginitis with profuse yellowish discharge and highly congested vaginal mucosa, is alum and the sulphate of zinc, the borate of soda and pure carbolic acid, of each one ounce, dissolved in one quart of water; of this two to four tablespoonfuls are added to a pint of tepid water, and a pint of this solution is injected every three to four hours, always preceded by a tepid water or soapsuds injection. As a rule, astringent injections should be so administered as to keep the solution in the vagina for at least a few minutes; the recumbent position with elevated hips is therefore *the* position for the purpose. I am aware, however, that very few vaginal injections are administered in this manner, the large majority of women using the crouching or sitting posture, and deriving proportionately less benefit. It is important always to caution patients against the staining of their linen by an injection fluid, and to recommend them to wear napkins after the injection when such a fluid has been prescribed. As a rule, agents which do not permanently stain the linen should be chosen for ordinary injections; if other articles, such as tannin, nitrate of silver, iron, or strong solutions of permanganate of potash, are employed, it will be found more effectual to apply them through a speculum two or three times a week, at a strength proportionate to the effect desired, and to direct the milder, non-staining injections in the interval. This is the manner in which I treat the majority of cases of chronic leucorrhea or vaginitis, whenever, be it understood, that symptom is sufficiently intense to require local treatment.

The best *alterative*, stimulant injection for the promotion of absorption of the products of pelvic peritonitis and cellulitis, and of the redundant tissue in subinvolution and hyperplasia of the uterus is always hot water, in large quantities, propelled with a certain amount of force. But where this force is not obtainable, and even where it is, the addition of some substance containing iodine has been found to be of value. We thus add to the hot water a certain proportion of simple or compound tincture of iodine (℥ j. to the pint), or iodide of potash in the same or stronger proportion; or sea- or rock-salt (½—1—2 ounces to the pint, or a handful to the basin of water); or the imported brine from the baths of Kreuznach, Kissingen, or Reichenhall should be added to the douche. As it is the iodine and bromine contained in these salts and fluids to which the alterative effect is due, the coarser the preparation the better; I therefore always recommend the common, unclarified salt in preference to the nicely-prepared sea- or table-salt. The salt solutions are, in my opinion, more beneficial than the weak iodine injections. In all cases it is essential that the

water be as hot as can be borne. The addition of iodide of potash to the injection-fluid will probably be feasible only in the better class of practice, since the expense of the drug will render its employment in the quantity necessary to prove beneficial as injection inexpedient for poor patients. In my opinion, common rock-salt answers quite as well. Patients living at the seashore can use ordinary sea-water heated to the desired degree as a vaginal injection.

The *emollient* injections consist of decoctions of flaxseed, slippery-elm bark, marshmallow root, poppyheads, gum arabic, milk, glycerine, melted vaseline, sweet or castor oil, etc. They are used in acute inflammatory conditions and wounds of the vagina, as they may occur after difficult forceps labors, burns from caustics, and after the operation for stenosis or atresia vaginæ. Their object is expressed in their name. The decoctions should, of course, be strained; the glycerine may be used pure, or mixed with water in different proportions. All the decoctions and the glycerine may be injected through the ordinary rubber syringe; the oils are best applied through a glass syringe, as the rubber is difficult to clean. All emollient injections should be used tepid, unless the patient prefers them cool.

Irrigation of the vagina with tepid water, if long continued, acts as an emollient, and local as well as general anesthetic, precisely as a warm bath soothes general irritability.

Narcotic injections contain various quantities of the narcotic drugs, chiefly opium, hyoscyamus, and conium, also stramonium. Thus one drachm or more of the tincture of one of these agents may be added to the pint of warm water, and the injection repeated as often as occasion demands. Or the infusion or decoction of poppyheads may be used. Or one of the bromides (of potash, sodium, ammonium) may be dissolved in water in the proportion of ʒ j. to ℥ ss. to the pint, and injected. Or the hydrate of chloral may be used in somewhat smaller quantity (ʒ j. to ij. to the pint); this agent also acts as a disinfectant, and is, therefore, particularly indicated in the cases of cancer, where disinfection and local anesthesia are both desired.

The bromides I have found of real benefit, in cases of so-called "irritable uterus," diffuse pelvic pains, and hystero-neuroses in various parts of the body. Injections containing them are best administered at bedtime. I have repeatedly seen a refreshing night's sleep follow the vaginal injection of one drachm of bromide of potash to a pint of water.

The opiates and other narcotics first named may also be used in similar conditions, but are more applicable to cases of uterine cancer. All these injections should be taken in the regulation position, with elevated hips, and the patient should remain in that position for fifteen to thirty minutes afterward.

The *indications and utility of vaginal injections* have to some extent been incidentally referred to in the previous sections.

I may mention here one species of injection which I have not before referred to, viz., that of alkaline solutions for excessive acidity of the va-

ginal discharge, whereby the spermatozoa are killed and sterility ensues. This acidity predominates in blondes, especially with red hair (Pajot), and is easily detected by the peculiar odor on withdrawing the finger or passing the speculum. Injections of carbonate and borate of soda and carbonate of potash, ʒ ss. to the pint, or stronger, have been recommended since Sims' investigations on the causes of sterility, to be used before retiring to rest each night. Byasson advises a liquid for the purpose, composed of two ounces of phosphate of soda, one white of egg, to one quart tepid water, in which spermatozoa have been kept alive for twelve days at a temperature of 36° C.

It is perhaps not out of place to say a few words here about the indications for the use of ordinary tepid, cleansing, vaginal injections. As a rule, the physician is not consulted either as to necessity, time, frequency, or counterindications of these injections. But he should consider that he may do good and avert damage by counselling his patients in this matter. It is surprising how little even educated women think of attending to the regular cleansing and bathing of their sexual organs. They may take full baths occasionally, but in the interval it does not occur to them that their vulvar and anal regions need quite as much (if not more) washing than their hands and faces. Every woman, indeed, should wash her genitals with a soft cloth or sponge after each urination, and certainly every morning and evening. A vaginal injection is, of course, not necessary so often. Women who do not suffer from habitual leucorrhea need not cleanse their vaginal canals oftener than once a week or so ; if they have a habitual discharge, one or two injections a day should be used, generally of some mild astringent, alkaline solution, or of soapsuds. A very common time for a vaginal injection with those of our ladies (unfortunately, by far too large a number) who desire to prevent increase of family, is immediately after sexual intercourse. It should be understood by the physician and impressed upon the lady, that such injections, aside from the doubtful morality of the proceeding, are objectionable and injurious, no matter whether the water used be cold or warm, or medicated. While a cold injection is positively injurious by the sudden shock the cold gives to the (at that time) highly vascular and congested pelvic organs, and by the inevitable, chronic congestion of these organs which must, in time, follow this interference with nature, even warm injections act harmfully by removing the emollient seminal fluid in which the turgid organs are bathed after coition. Look upon the evils of a too rapid succession of pregnancies and the prevention of this evil by the checks so enthusiastically advocated by the disciples of the Malthusian school in whatever light we may, we cannot close our eyes to the indisputable fact that all such interference with the physiological performance of the function of reproduction—with the designs of nature, as some express it—is wrong, and will sooner or later bring its own retribution.

During the menstrual flow, of course, vaginal injections are prohibited, not that a gentle, tepid injection would do harm, but because the popular voice and opinion is against them and they are not necessary. But, after

the cessation of the flow, a tepid, cleansing injection would be both proper and serviceable in removing the débris of the uterine flow.

It is scarcely necessary to point out more specifically in what class of cases the vagina needs to be washed out antiseptically, as the character and amount of the discharge will be sufficient indications for the necessity, frequency, and strength of the injection.

The indications for astringent injections may also be briefly summed up under two headings: a vaginal discharge of mucous or muco-purulent character, and hemorrhage from uterus or vagina. In acute or subacute inflammatory conditions of the vagina or cervix, with or without abrasion of epithelium, the nitrate of silver solution is the best application. As already stated, it is advisable to apply it repeatedly through a speculum, and direct a mild astringent injection three or four times daily in the interval. For ordinary leucorrhea the astringents already enumerated may be either used alone, or in the interval between stronger applications made through the speculum.

In hemorrhage, which is usually from the endometrium or the cervix, rarely from the vagina proper, the thermic astringents, very hot or very cold water, will act better than *mild* medicinal astringents. Concentrated solutions cannot be applied as injections for reasons already stated, but must be introduced through a speculum, and will doubtless be required in all cases of obstinate or profuse hemorrhage. If the hemorrhage comes from the endometrium, it will be arrested only by the influence on the whole pelvic circulation of high or low temperature, and I have already stated my preference for hot water. Still, I have occasionally seen uterine hemorrhage checked by the injection of vinegar and ice-water, equal parts, and, as a rule, I think the hemostatic effect of *cold* applications more permanent than that of heat. If the flow be a menorrhagia—profuse menstruation—especially, but even in any uterine hemorrhage other than mere stillicidium from vascular relaxation, a cold styptic injection is hazardous, since it might not only arrest the flow, but also produce the undesired result of lighting up a pelvic cellulitis or peritonitis. This, *hot* water would not do. If the hemorrhage proceeds from an accessible surface, it is always best to endeavor to arrest it by direct applications through a speculum, which may be followed and confirmed by hot injections, medicated or not, rather than attempt the, as regards permanent effect, rather uncertain injections, hot or cold. Although a direct styptic or astringent effect is not expected on the endotrachelian surface, the fluid of a vaginal injection will enter the cervix if the external os is patulous or positively gapes, as is the case after ununited laceration and chronic endotrachelitis. Thus applied, injections may act beneficially on pathological conditions of the cervix.

Astringent injections in chronic vaginal discharges generally require to be continued for a long period, and the astringent should occasionally be changed, if the one in use proves ineffectual after a fair trial of several weeks; or the strength should be increased.

The indications for alterative, emollient, and narcotic injections have

already been referred to. The most valuable results are obtained from the alterative injections in cases of areolar hyperplasia or subinvolution of the uterus, and acute, subacute, and chronic inflammation of the pelvic peritoneum and cellular tissue. The treatment of these affections without the assistance of that greatest of all alteratives, heat, would be discouraging indeed. And this brings me to the discussion of the rationale of hot injections as a therapeutic agent in producing contraction of blood-vessels and absorption of hyperplastic tissue and plastic exudation.

The immediate effect of cold when applied to a living tissue is to produce shrinking of the tissues and reflex contraction of the blood-vessels; when the cold is removed, this effect rapidly wears off and the, in every animate body, inevitable reaction follows, the blood-vessels dilate to a still greater calibre than before, and the congestion is increased instead of diminished. With heat the order of effect is reversed: First, the capillaries are relaxed, the tissues swell, but soon the stimulus of the heat excites reflex action, the vessels contract and the tissues shrink, and this effect continues much longer after the removal of the heat than it does after the application of cold. Besides, the nutrition of the part is not interfered with by heat, as it is by cold; for the relaxed capillaries regain their tone, and transmit the blood more rapidly, while the contraction of cold is so severe as to arrest circulation entirely, if continued. Thus in their immediate effects extreme heat and extreme cold are identical; it is in the permanence of the effect, and in its influence on the faculty of absorption that they differ. The contractile effects of continued heat are vividly exemplified by the bleached and shrivelled hands of washerwomen, and the blanched appearance of the skin under a poultice (Emmet).

According to Emmet all pelvic congestion is venous, and the term "chronic inflammation," so far as it applies to the organs in that cavity, is a misnomer, simply because the arterial vessels are not involved in that process. Although hot water will contract the arterioles also and thus perhaps abort an attack of acute inflammation, it is mainly in the chronic venous congestion constituting the chief factor in subinvolution, hyperplasia, and old pelvic hyperemia, that its use is so eminently beneficial. Its effect is naturally greatly enhanced by raising the hips and aiding the emptying of the veins by gravitation. This point is particularly insisted upon by Emmet. The unloading of the venous plexuses by gravitation is assisted and confirmed by the hot water, and the contraction of the vessels maintained by keeping the patient in the recumbent position for some time afterward. The most benefit is, therefore, derived from the hot injections when given at bedtime, the patient not rising from her couch until the next morning. It is obvious that success in this treatment—that is, permanent restoration of tone and calibre of the blood-vessels—depends mainly on the high degree of temperature, large quantity, long duration, and steady perseverance with which these injections are administered, not omitting the proper position with elevated pelvis.

Little by little, as the patient improves, the temperature of the injections may be gradually, almost imperceptibly lowered, the amount and force

reduced, and but one injection a day given, until the temperature of 60° F. is reached and they are discontinued. Emmet advises their continuance during some months for several days after each menstrual period, at a temperature slightly above blood heat, in order to avert any relapse at this critical period, and also at a higher temperature, if from any cause a pelvic congestion or inflammation seems imminent at any time.

The value of these systematic, carefully administered, and perseveringly continued copious hot vaginal injections is certainly not overestimated by their author and chief advocate, Emmet. Hot injections in uterine disease, it is true, were recommended years ago by Sédillot, Trousseau, Kiwisch, and Scanzoni, but never with the degree of system and perseverance necessary to a successful result. It is certain that they fell into disuse, except in the one instance of the artificial induction of premature labor by the forcible hot vaginal douche according to Kiwisch; and when I was studying gynecology under Scanzoni, eighteen years ago, no mention was ever made of this treatment for female pelvic affections. It is true, that warm baths and injections of brine were recommended, but the chief benefit of these baths was attributed to the mineral constituents, not to the hot water. Since then the revulsion of feeling has been so great that cold water injections have fallen almost entirely into disuse, and hot water has been substituted for it in all classes of uterine disease by all gynecologists who follow the lead of the modern pelvic pathology so ably and logically demonstrated by Emmet. The importance of carefully attending to all the details of this treatment, as described at length in the preceding pages, should be impressed on both physician and patient as essential to success.

To give special indications for hot vaginal injections scarcely seems necessary after all that has been said here on the subject. Suffice it to say that they are indicated in all conditions of chronic venous congestion of the pelvic organs, in subinvolution and hyperplasia of the uterus, particularly; further, in chronic ovarian congestion, so-called "chronic ovaritis," and in all cases where the pelvic cellular tissue presents evidence of the previous occurrence of inflammatory exudation and subsequent induration, so-called "chronic pelvic cellulitis and peritonitis." Further, acute attacks of this latter affection, or of metritis or ovaritis, may be aborted by hot injections, if used at the very outset. Acute, subacute, and chronic vaginitis, leucorrhea from want of tone of the vaginal tissues, are also indications.

Nervousness and sleeplessness in a hysterical woman may be allayed by prolonged hot vaginal injections at bedtime, in very much the same manner as a long warm sitz-bath will quiet and induce sleep.

An indication which is not ordinarily considered in directing the prolonged use of hot vaginal injections, is that of hemostasis. But the rationale is the same as when they are used in venous congestion, viz., the contraction of the blood-vessels. Hot injections are therefore indicated in cases of uterine or vaginal hemorrhage, chiefly when the bleeding surface can be directly touched by the water, as in erosions, granulations, lacera-

tion, epithelioma, or real carcinoma of the cervix. But even when the flow comes from the uterine cavity, as in menorrhagia from whatever cause (functional, vegetations, fibroids, sarcoma), the contraction of all pelvic blood-vessels by the heat will diminish the flow from the uterus, although the bleeding surface is not directly touched. It is thus not only allowable, but advisable (unless special counterindications exist) to control or check a profuse menstrual flow by hot injections. No harm can result from this practice, wherein it differs decidedly from the not uncommon but hazardous use of cold injections for the same purpose. Before operating on the external genitals, vagina, or uterus, a very beneficial effect can be produced by rendering the parts anemic by hot-water applications or injections immediately preceding the operation. The saving of blood to the patient, and the convenience of but slight oozing to the operator, are points well worth considering.

An innovation in plastic operations on the female genital organs, chiefly colpo-perineorraphy, has recently been introduced in Germany, in the use of the irrigation with hot or cold sublimated or carbolized water of the field of operation, in place of the sponging heretofore and elsewhere still in vogue. As the patient in these operations occupies the dorsal position at the edge of the table, the water flows directly into a vessel underneath the table; for operations in the lateral decubitus and through Sims' speculum this method would obviously not be so applicable.

Counterindications and Dangers.—I know of but one objection to a proper vaginal injection for a given case, and that is the possibility of injecting the fluid directly into the uterine cavity. The manner in which this occurs, through a lacerated or gaping cervix and patulous internal os, particularly in a retroverted and prolapsed uterus, and the dangers of this accident have already been fully discussed. Also the means of averting it. Other than this, I can conceive of no condition in which a properly indicated injection (hot, cold, or medicated, as the case demands) could be injurious when carefully applied according to the rules above given. I need scarcely say that pregnancy would, of course, counterindicate a hot injection. Emmet speaks of occasionally meeting cases in which so much discomfort and pelvic weight was experienced after the hot injections, as to lead him to discontinue them. He confesses his inability to explain the why and wherefore of this occurrence, but says that he long since found that the injection in these cases is well borne, if the temperature does not exceed 95° at first, and is very slowly increased. I have noticed similar effects, besides hearing complaints of faintness, weakness, and nervousness as immediate consequences of the hot injection. I have invariably overcome these symptoms in the manner prescribed by Emmet.

The possibility of lighting up a fresh or rekindling an old pelvic inflammation by the forcible injection of hot water into the vagina, which has been advanced by some of the old-school gynecologists, is not to be admitted for a moment. The first instance of such an occurrence is still to be reported.

b. Through Specula.

The *indications* for the application of medicinal agents to the vagina or cervix through the medium of a speculum are such conditions of these parts as call for direct treatment with substances too concentrated to be used by injection. Such conditions are: *Cervix:* Erosion with or without papillary hypertrophy, laceration with eversion and cystic hyperplasia, endotrachelitis with patulous os; ordinary areolar hyperplasia, malignant disease, specific ulceration. *Vagina:* Acute vaginitis, granular vaginitis, obstinate chronic leucorrhea, venereal warts. Experience has shown that the allowable strength of vaginal injection fluids is entirely inadequate to exert the necessary irritant astringent or styptic effect on these conditions, and that powerful caustics, astringents, or styptics must be directly applied to the diseased surface. This is possible only through one of the various forms of specula, by which the healthy tissues are protected from the agent. In this manner either the cervix alone, or cervix and vagina, or any one portion of the vagina may be touched by the agent, without the normal internal or external parts being affected.

Besides the conditions of the cervix and vagina named as calling for strong direct applications, there are subacute and inflammatory processes in the pelvic cellular tissue and peritoneum and the ovaries, which are much benefited by the application of strong counter-irritant or absorbent agents to the vaginal roof. I have met with excellent results from such measures in chronic pelvic cellulitis and peritonitis and chronic ovaritis, if continued persistently for a long period in conjunction with the systematic use of hot injections.

Occasionally a hyperplastic condition of the vagina is met with as the result of chronic vaginitis, a so-called pachy-vaginitis chronica, which is relieved by similar strong absorbent applications.

In areolar hyperplasia and subinvolution of the whole uterus, I have found applications to the whole intravaginal portion of the cervix of strong tincture of iodine to aid the hot injections in reducing the enlargement and to relieve very decidedly the peculiar local neuralgic and general hysterical symptoms so commonly met with in those affections. Such relief, to be sure, is generally but temporary; still, in such intractable affections as old hyperplasia uteri even that much is worth having.

The most common conditions in which the application of concentrated agents in substance or solution to the vagina or cervix is indicated are: hypersecretion of the vaginal mucous membrane, either acute or chronic; erosion of the cervix and external os, and malignant disease of the cervix.

An application, which is frequently required, as a styptic and caustic, in malignant disease of the cervix, is the actual cautery, either by means of the old-fashioned cautery iron, Paquelin's thermo-cautery, or the platinum tip of the galvano-cautery battery.

Substances Applied through the Speculum, and Manner of Applying them.

Any of the medicinal agents enumerated in the preceding chapter as serviceable in a highly diluted condition as vaginal injections may be applied to the cervix or vaginal walls in a pure or more or less concentrated state through a speculum. But by no means all of these agents are so applied, since some of them can be replaced by remedies of greater efficiency in their concentrated form, and the use of others has by custom been confined to injections. Thus, we are not in the habit of applying the acetate of lead, the sulphate of zinc, the permanganate or the chlorate of potassium, salicylic acid, sulphite of sodium, etc., in substance or concentrated solution through a speculum ; not that they might not be used beneficially, but that we have other more efficient agents which the speculum permits us to use safely. On the other hand, there are powerful remedies, like concentrated nitric acid, bromine, chromic acid, acid nitrate of mercury, caustic potash, which are not used in dilute solution, but exert their best effects when applied in a concentrated form.

The effects to be obtained from the various agents are either astringent, caustic, alterative, hydragogue, emollient, or narcotic. Of *astringents*, those chiefly used in substance, or strong solution, or otherwise, through a speculum are : tannin, hydrastis, alum, sulphate of copper, tincture of chloride of iron, persulphate of iron, acetic acid ; *caustics :* nitrate of silver, carbolic acid, nitric acid, chromic acid, bromine, acid nitrate of mercury, sulphurous acid, caustic potash, actual cautery ; *alteratives :* iodine, in form of simple or compound (Churchill's) tincture, iodide of potash in concentrated solution, iodoform in powder or solution, iodide of lead, unguentum hydrargyri ; the only *hydragogue* is glycerine ; *emollients :* olive, or poppy oil, vaseline, powdered flaxseed, or slippery-elm bark ; *narcotics :* extract or tincture of opium, or belladonna, or conium, hydrate of chloral, bromide of potassium, sodium, or ammonium, iodoform.

In accordance with the chemical properties of these agents they are applied through the speculum in substance (stick, crystals, powder), or in a fluid or unctuous form.

If applied in substance, they may be either withdrawn at once on the attainment of the object (as after cauterization with stick of nitrate of silver, or crystals of chromic acid), or left in apposition with the diseased surface for a greater or lesser time, the healthy parts being protected by cotton wads. If used in fluid form (solution, or natural fluid, as nitric acid, sulphurous acid) they may either be withdrawn at once, or remain in contact with the tissues by being conveyed on, or retained by cotton wads, introduced through the speculum.

a. In Substance.

The agents which may be, and frequently are applied in substance (stick, crystals, or powder) are : nitrate of silver, chloride of zinc, caustic

potash, chromic acid, tannin, iodoform, persulphate of iron, alum, sulphate of copper, iodide of lead, hydrate of chloral, the bromides.

The *manner of applying* these substances is by means of one of the three main varieties of specula (tubular, bivalve, Sims). As the stronger agents are generally applied merely to the cervix, the introduction of a large tubular speculum, if such a one be used, is advisable in order to obtain a view of the whole cervix. The application is then made by more or less thoroughly touching the diseased surface with the stick, if nitrate of silver, sulphate of copper, or caustic potash, be used; or thrusting the crystal or powder against the cervix with a spatula or cotton-wrapped stick (Fig. 87), if the substance employed be in that form. Only tannin, iodoform, iodide of lead, persulphate of iron, alum, sulphate of copper, chloral, and the bromides, may be retained in contact with the cervix for twelve or twenty-four hours; the stronger salts should be removed after a few minutes by wiping them off with a sponge on a holder, or the cotton-wrapped rubber-stick, or by a tepid injection. The effects of a caustic being generally immediate, there is nothing to be gained by leaving an excess of it in contact with the cauterized part; the excess should therefore be removed or neutralized, and this is done in the case of the nitrate of silver by an application or injection through the speculum of a solution of chloride of sodium.

Fig. 87.—Straight Whalebone Stick, with Notched End, for Wrapping with Cotton, as Shown in Smaller Cut.

For all applications (solid or fluid) to the cervix alone, the cylindrical speculum surpasses the other forms, provided the vaginal orifice permits the introduction of a sufficiently large tube to fully expose the cervix. The speculum should not be too large, however, as in that case portions of vagina might readily slip into its lumen beside the speculum and be cauterized involuntarily. If the agent is to be kept in contact with the cervix for some time, care is taken that the excess be not too great, and a wad of cotton tied about its middle with a stout string is introduced up to the cervix and firmly held there with the dressing-forceps while the tube is withdrawn; the string then projects from the vulva and allows the removal of the cotton by the patient herself. This cotton tampon may be either dry or, what is preferable, wet and squeezed out, so that the crystal or powder will better cling to it and remain where it was placed. Or, the tip of the conical tampon (wet or dry) may be sprinkled with the powder and introduced directly against the cervix.

In profuse hemorrhage from the cervical cavity, as may occur in cervical cancer (it once happened to me while curetting the cervix, to open an eroded branch of the uterine artery, with the result of almost fatal hemorrhage), it may become necessary to throw in the styptic, preferably the powdered persulphate of iron, by the spoonful, until the hemorrhage

is arrested. I have thus packed the bleeding cavity full of the powder, each subsequent spoonful coagulating the blood which oozed through the preceding powder until a sufficiently firm clot was formed to arrest the bleeding. The application of styptic solutions on cotton to the bleeding surface would scarcely suffice to arrest hemorrhage of so violent a character as that which I have just described. When a firm coagulum has once been formed, it is well to support it by pressure with a column of tampons, as will be described hereafter. The styptic should be kept as much as possible from the sound parts, particularly the vaginal surface. While the more powerful agents are applied only to the cervix, the milder powders and crystals, such as tannin, iodoform, and alum, are employed also in inflammatory or relaxed conditions of the vaginal mucous membrane. Either of the powders named may be thrown into the speculum by means of a spatula or spoon, and then, being pushed forward toward the cervix, is brought in contact with every part of the vagina by rotating and withdrawing the speculum until its point almost reaches the orifice, when it is again introduced merely half-way and a round tampon placed in the speculum and held *in situ* by the forceps while the tube is removed. In this manner the powder-covered walls of the upper portion of the vagina are allowed to approach each other, and the powder is not pushed up into the fornix, as will be the case if the tampon is introduced as far as the cervix. Or, the tampon may be moistened, squeezed out, rolled in the powder, and then pushed up to the cervix, when the conical shape of the tampon will place and keep the powder in permanent contact with the whole vaginal circumference.

The substances named may be applied pure, especially the tannin. But pure alum is generally too strong, and gives decided pain; it is therefore best diluted with equal parts of sugar. The strong unpleasant odor of the iodoform renders it decidedly objectionable to patients going about their daily duties and mingling with other people. When mixed with equal parts of tannin, or with Peruvian balsam, the iodoform loses much of its odor, and proves a very efficient antiseptic, astringent, and alterative. One of the best deodorizers of iodoform is hydrate of chloral, which I have recently been using in this combination as a local application to the cervix and vaginal vault. In painful affections of these parts (chronic cellulitis and peritonitis, carcinoma, etc.) the chloral forms a very useful addition to the iodoform. The formula which I employ is the following: ℞. Iodoformi, hydrat. chloral, alcohol, āā ʒ ij.; glycerine, ℥ iv. M.—Sig. To be applied on a cotton tampon and retained at least twenty-four hours.

I have described the application of stick and powders to cervix and vagina through the tubular speculum, which is essentially similar to their use through the bivalve; with the latter, however, great caution should be observed to prevent the agent, if powerful, from touching healthy tissue; and the application of powders to the vagina is not as convenient as through the tube. Still, it can readily be done in the same manner by withdrawing the bivalve and closing the lower half of the vaginal canal with a tampon. These tampons, when used merely as stoppers to the

escape of the powder, are best introduced perfectly dry, and should be conical in shape (see Fig. 92). Through the Sims speculum powders are best applied on a tampon, the surface of which has been covered with some emollient, as vaseline, or which has been dipped in glycerine or oil. I frequently use them in this way in leucorrhea, and chiefly in prolapse of the anterior or posterior vaginal wall, or both, with descensus uteri, when I wish to introduce a tampon of sufficient size to insure its retention. If but one wall of the vagina is prolapsed or relaxed, the powder on the tampon may be limited to that portion which is placed against the prolapsed part. In widely gaping vaginæ the tampons may be introduced by the patients themselves; and in any case they should be retained by a T-bandage.

The powdered flaxseed and slippery-elm bark may be enclosed in small muslin bags of the size of an English walnut to a hen's egg, and securely tied with string; they are then dipped in boiling water and introduced up to the cervix, either by the physician through a speculum, or by the patient's fingers, while the latter occupies a dorsal position, and are retained for from twelve to twenty-four hours. The soothing emollient effect of these poultices is beneficial in various inflammatory disorders of the pelvic organs (chronic cellulitis, ovaritis, and metritis). By the addition of one-fourth to one-half teaspoonful of powdered alum, borax, or sulphate of zinc to the flaxseed or elm-bark, the poultices may be made astringent as well as emollient and absorbent. Powdered myrrh is also reported to be an excellent stimulating adjuvant, as also the powdered root of sanguinaria Canadensis.

If a powerful caustic, as chromic acid or caustic potash, is applied to the cervix through the Sims, it is best to protect the subjacent part of the vagina by packing cotton between it and the cervix, which is removed when the application is completed and all excess of the remedy wiped off or neutralized.

If any portion of the vagina is to be touched, as in the case of ulceration from pressure by a too long worn pessary, or ulceration of any kind, or venereal papillomata, the Sims speculum allows the best exposure of the part. The caustics used to the vagina are either the nitrate of silver, sulphate of copper, or alum, all in stick form. A conical tampon smeared with vaseline should then be introduced to prevent friction of the cauterized spot and contact with sound tissue.

Special Indications for Solid Applications.—Although the affections in which solid substances are best applied to the cervix and vagina have been cursorily referred to in the preceding pages, it may be well to specify more clearly the precise conditions in which they alone are beneficial or are preferable to the same agents in solution.

The strong caustics or escharotics, such as caustic potash, chloride of zinc, and chromic acid are used only in malignant disease of the cervix or vagina, when it is desired to destroy the diseased tissue to its very core. The caustic potash and chloride of zinc are used in stick or pencils, which are bored to the desired depth into the diseased tissue near the sound

border, and allowed to melt there. The action of these powerful escharotics should be confined to the growth by protecting the sound parts with oil or lard on cotton, or by cotton soaked in a solution of bicarbonate of soda. Chromic acid, not being deliquescent like potash, does not require to be so carefully watched against spreading ; the crystals are simply scattered on the diseased surface and soon combine with the secretions and form a dry eschar, which must be prevented from touching adjacent parts by cotton smeared with vaseline, or soaked in a solution of bicarbonate of soda. As a rule, it is more convenient to employ a saturated solution of chromic acid, which can be applied with an applicator or stick wherever desired. The nitrate of silver, even in its stick form, is too superficial a caustic to be of any great avail in malignant disease ; it will barely suffice in default of better. It has been *the* great remedy for all so-called "ulcerations of the womb," and has done its full share of harm. I hardly know under what circumstances I should employ it, if I had one of the other equally efficient and (subsequently) less injurious caustics at hand. I shall refer later on to the dangers and limited uses of the solid lunar caustic. In obstinate papillary erosions of the cervix, the crystals of chromic acid may occasionally remove the indolent suppurating surface and set up healthy reparative action. The chloride of zinc is perhaps the most useful and reliable escharotic in malignant disease. But I believe I am not mistaken when I say that at present the extirpation of cervical or vaginal cancer by the unaided application of these powerful escharotics has been abandoned. Only after curette, knife, and scissors have paved the way and removed the bulk of the growth, is the escharotic (usually in solution) employed to dispose (so far as it can) of the remains of the enemy.

The *actual cautery* is used in the same class of cases as the strong escharotics, viz.: simple and papillary erosion, epithelioma and ulcerating carcinoma of the cervix ; also in aggravated instances of chronic endotrachelitis with eversion and hyperplasia of the lips. Formerly, it was customary to apply the hot iron to carcinoma of the cervix as a hemostatic without previous preparation; the effect was always superficial, and the result generally very evanescent. Now, the diseased surface is thoroughly scraped, and as much pathological tissue removed as possible, before the heat is applied ; the result is evidently vastly more lasting, especially if the iron be applied at red-heat, so as to extend below the surface, char the deeper parts, and produce a slough. Such applications, either of heat or escharotics, require to be repeated at greater or lesser intervals in accordance with the rapidity of reproduction of the vascular malignant granulations, and should, as at first, be preceded by the sharp curette.

I have frequently applied the actual cautery in one form or another to malignant growths of the cervix uteri, with a view to arresting the hemorrhage and retarding the progress of the disease. While I have certainly succeeded in attaining the first object, I have failed quite as markedly in the second ; indeed, it has seemed to me, almost, that the growth increased more rapidly after cauterization, and sprouted out into the peri-uterine

cellular tissue, as though the heat stimulated cell proliferation. At all events, it appeared to me that the disease remained more stationary after the use of escharotics, and for a time at least was confined to the cervix. There can be no question that the deeper the slough produced the more beneficial will the application be, and I think we get such a slough from the permanent application of a strong escharotic more certainly than from the actual cautery.

In erosion (simple or papillary) of the cervix, the actual cautery is an excellent application. Of course it should be applied less deeply than in malignant disease, since but a very superficial slough is desired.

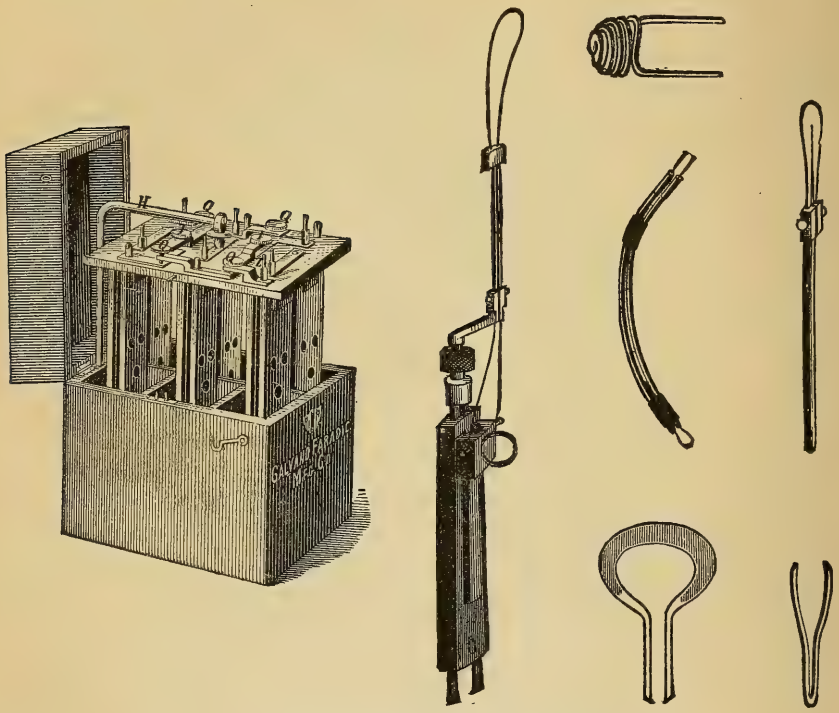


Fig 88.—Galvano-cautery Battery of Piffard, and Cautery Instruments.

It is of extreme importance that the degree to which the cautery is heated be carefully regulated; for a caustic escharotic effect, when a deep slough and wide-spreading reaction is desired, the red or even white heat is required; but when a styptic or merely astringent action is intended, the iron should be at black heat only.

There are three varieties of apparatus by which the actual cautery may be applied: the old-fashioned cautery irons of different shapes and patterns, the galvano-cautery, and the thermo-cautery of Paquelin. A very simple and mild thermic effect may be produced by applying the melted end of a stick of sealing-wax to the diseased surface; for want of better, this expedient may be used in simple erosion of the cervix. The cautery

irons are of different shapes and sizes, according to the extent of the surface to be touched; thus we have them with a round flat tip, or button, an olive, or a slender point, the button and olive being the most common. The iron is fastened in a convenient handle of wood. These irons are heated by simple immersion in a fire or flame. The metal of the cautery tips in the galvano-cautery apparatus is platinum, the shape of the tip being generally that of a spiral cone of wire, although a knife-shaped tip is used when a portion of tissue is to be removed. The thermo-cautery apparatus of Paquelin is a recent invention, and has rapidly grown in favor for short operations, almost supplanting the galvano-cautery by its portability and convenience. It consists of a tip of platinum (of various shapes) which is heated by a flame of benzine blown upon it from the handle, by means of a rubber balloon and tube attached to it. The button-shaped tip is the one ordinarily used to cauterize a flat or hollow sur-

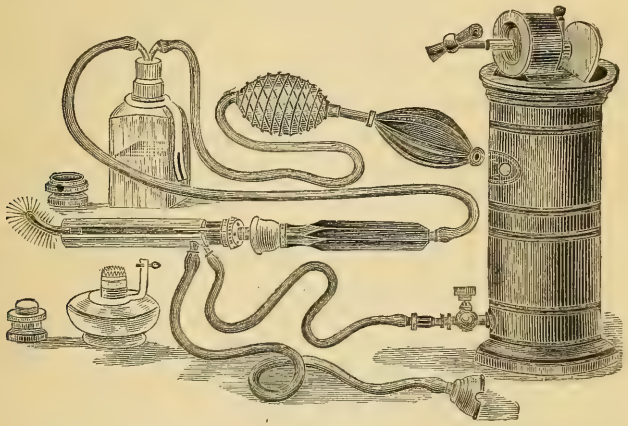


FIG. 89.—Paquelin's Thermo-cautery Apparatus with Wilson's Antithermic Shield.

face; the pointed tips to perforate deep-seated abscesses in the broad ligament, or cauterize the cervical canal, the knife to remove a portion or the whole of the cervix, etc. The platinum tip requires to be heated to a red heat in a spirit-lamp, when the benzine vapor is blown into it and ignites. The compression of the rubber bulb keeps the platinum at the required degree of heat. For the purpose of protecting the neighboring parts from the radiating heat in long operations on the cervix, chiefly amputation, a very ingenious contrivance has recently been devised by Dr. H. P. C. Wilson, of Baltimore, which consists of a hollow metal shield for the cautery shaft and tip, through which shield a current of cold water is kept running by means of an Eguisier's irrigator at one end, and an exit-tube at the other. The accompanying cut gives a good representation of the "antithermic shield," as its inventor calls it, and its attachment to the cautery. In long operations which must be performed through Sims' speculum, this protective is indispensable; for mere styptic or escharotic applications of the cautery, which may be made through any form of specu-

lum which exposes the diseased part, no such addition is needed. I have always used the Sims speculum; but a large tubular speculum, or a widely expanded bivalve, will answer very well when only a momentary caustic application is intended. Tubes of horn have been constructed for this purpose, but the hard rubber is almost as good a non-conductor of heat; when the application is momentary, however, an ordinary glass tube will do, since the application is too short to crack the glass.

After the application of the cautery to the cervix, a cleansing injection should be made through the speculum to remove all débris, and protective tampons, smeared with vaseline applied. If the cautery was used as a hemostatic, it is advisable to tampon the vagina tightly with flat cotton disks (as hereafter to be described), since unexpected separation of the eschar and violent secondary hemorrhage might take place. It is also well to be on the safe side and to tampon the vagina again tightly after removing the first set at the end of forty-eight hours, since secondary hemorrhage may occur at any time within a week or longer after the first cauterization. A single sad instance has forcibly fixed the utility of this precaution in my memory. I lost a patient from secondary hemorrhage seventy hours after curetting and searing the cancerous cervix with Paquelin, the hemorrhage not appearing until after I had removed the first light tampons and, finding the stump absolutely bloodless, had merely inserted a few lightly packed tampons. I do not believe that in this case any form of tamponade could have prevented or checked the bleeding, which was frightful, the slough having apparently opened not only the circular artery but also the large pampiniform veins. But this danger of the slough possibly extending deeper than was intended obtains in every cauterization, and hence the precautionary tamponade.

The cautery is attended by so little pain, and is so rapid, that it is unnecessary, for that reason alone, to give an anesthetic. It is only when the patient is very timorous or restless, and the preparations inevitable to the starting of the cautery (heating of the irons, connection of the current, heating of the tip, and blowing of the benzine flame), or the hissing noise produced by the contact of the cautery with the flesh, frighten her, that it is advisable to anesthetize her. The dangers of the operation consist in secondary hemorrhage and the production of inflammatory reaction in the parametrium. Of the former I have just spoken; the latter result I have never known to occur after the styptic or escharotic application of the actual cautery. Generally it is not necessary to confine the patient to her bed; if she is so confined for twenty-four hours or longer, it is not because of the cautery, but of the curetting or other operation which preceded the cautery. As a rule, the employment of a dull, scarcely red heat, and a very slow operation, will generally obviate the danger of secondary hemorrhage. Its further consideration is beyond my present plan.

After-treatment.—The after-treatment of a cauterized cervix after the slough has separated and the danger from secondary hemorrhage is past, consists in tepid, mildly disinfectant injections until granulation is established (once or twice daily, care being taken to insert the nozzle of the

syringe only just within the vaginal orifice, in order not to accidentally excite bleeding), and later in mildly astringent injections (sulphate or chloride of zinc, alum, etc.) until the surface has cicatrized over and all discharge ceased.

Precautions.—In applying the solid stick of nitrate of silver to the cervix, it should be borne in mind that its thorough or too frequent use is almost invariably followed by cicatricial contraction of the external os and cicatricial toughening of the mucous membrane covering the cervix. The stick of nitrate of silver should, therefore, be employed only in cases where the external os is patulous and abnormally large, where, indeed, its contraction is desired; in all cases with normal or small os the milder solutions of the nitrate are to be preferred; indeed, the stick should never be used until the solutions have failed, and even then the superficial application of nitric acid, as hereafter to be described, is advisable before resorting to the solid silver-nitrate. This fear of cicatricial contraction following the stick may be exaggerated; but competent observers support my experience that many a utero-ovarian neuralgia, with consequent general malnutrition, many a dysmenorrhea and sterility, has been produced solely by the inclusion of nerve-filaments in, and the stenosis of the external os by the cicatricial tissue of solid nitrate of silver applications to the cervix for "ulceration of the womb." The modern gynecologist of experience has learned to use the silver stick to the cervix only when he wants cicatrix and contraction; and even then he finds that contraction is much more easily procurable by paring the edges of the os and uniting them by sutures. The formation of cicatricial tissue on the cervix he avoids, for he knows that it may prove the source of local and general trouble, even though it may not, except in aggravated cases, produce such marked general anemia as Emmet claims. I can frankly say that, while I always carry the stick of nitrate of silver in a long vaginal porte-caustique in my gynecological satchel, I do not recollect using it for several years, except in one case of chancroid of the cervix, in the absence of nitric acid, which I subsequently applied, and in the worst case of cervical catarrh which I have seen. So beneficial and indispensable as are the solutions of different strength of the nitrate of silver in the treatment of inflammatory, desquamative, and ulcerative affections of cervix and vagina, so injurious and reprehensible is the solid stick. It was the sheet-anchor of the gynecologist of the past, and it has done vastly more harm than good. The substitution of a dense cicatricial surface for a soft, granulating, secreting erosion is but a poor exchange; the bad effects are generally not felt until long after the patient has been discharged "cured."

A word of caution should also be spoken against the use of chromic acid in crystals or strong solutions. In some persons of unusual susceptibility it is very rapidly absorbed and produces unpleasant nervous shock, vomiting, and diarrhea. I once met with such an effect in a case of carcinoma of the cervix, to which I applied a saturated solution of chromic acid after scraping away the bleeding granulations with the curette. The peculiar dry, burning sensation in the fauces was expe-

rienced in less than ten minutes, shock and collapse, vomiting and diarrhea soon followed, and for several days the patient was severely ill. The application should, therefore, be superficial, and all excess of acid be at once removed.

β. Fluids.

The *medicinal agents* which are employed in a fluid form, either in their natural chemical state or in solutions of various strength, to the cervix and vagina are: *Escharotics:* Nitric acid, chromic acid, bromine, acid nitrate of mercury, saturated solution of chloride of zinc. *Caustics:* Nitrate of silver, carbolic acid, iodized phenol (carbolic acid and tincture of iodine, equal parts), pyroligneous and acetic acid. *Astringents and styptics:* Tincture of chloride of iron, Monsel's solution of the persulphate of iron, solution of tannin in glycerine, mixture of bismuth and glycerine, decoctions of oak and willow bark (all containing tannin), fluid extract of pinus and hydrastis Canadensis, and of eucalyptus globulus, strong solution of alum, acetate of lead, of sulphate of zinc or copper, saturated solution of resin in alcohol (James' styptic), simple vinegar. *Alteratives:* Tincture of iodine, solution of iodide of potash, solution of iodoform in glycerine, cantharidal collodion. *Hydragogue:* Glycerine. *Emollients:* Oil of olives or poppies. *Narcotics:* Tincture of opium, belladonna, conium, or hyoscyamus, solution of hydrate of chloral, saturated solution of the bromides of potash, ammonium, or sodium. *Disinfectants:* Corrosive sublimate, carbolic acid, boracic acid, chlorinated soda, thymol.

Manner of Using and Special Indications.

According to the effect desired these agents are left in contact with the diseased surface for a shorter or longer period. As a rule, powerful substances, like the escharotics, then, agents which act instantaneously like caustics, and the effect of which is not increased by longer contact, are only applied for an instant, and then removed or their excess neutralized. Astringents, styptics, emollients, especially alteratives, hydragogues, and narcotics, on the other hand, require to remain in contact with the part for a period varying from several minutes to twenty-four hours, in order to exert their full effect. These latter, therefore, are best applied on a convenient vehicle, which, in gynecological practice, is represented by a pad or roll or ball of cotton, known under the name of tampon, the varieties, uses, and indications of which will be described at length in the chapter on Tamponade of the Vagina.

Fluids may be applied through either of the three varieties of specula, but it is for this purpose that the tubular speculum may be said to offer special advantages, and for this only. I have for years employed the tubular speculum solely for the purpose of applying fluids to the vagina, using the bivalve and Sims for that purpose only in the case of applications of tincture of iodine to the vaginal vault. Ointment and powders, when conveyed on the surface of tampons, can be equally well applied through either of the three specula. Strong fluid escharotics are best ap-

plied to the cervix through a cylinder, if the cervix be not too large to enter the speculum, or the vagina too small to admit a sufficiently large tube, for the reason that the escharotic is less liable to touch the sound tissue than if applied through a speculum which exposes the vagina also; this is particularly true of a diffusable escharotic like caustic potash. However, as will be described hereafter, it is easy to protect the sound tissues by covering them with cotton; and I am in the habit of applying escharotics to the cervix through the Sims speculum held by my nurse.

In order that I may cover the subject completely, and that no point of practical importance be overlooked, I will proceed to describe, in detail, the application of each of the fluid agents above named, even at the risk of occasional repetition. In default of practical experience in these minute technicalities, the only means of affording the practitioner the opportunity to become acquainted with them, and to avoid annoyance to himself and pain to the patient, is to give him a description so minute as to enable him to see, in his mind's eye, every step of the various methods employed in minor gynecological therapeutics.

This must be my excuse, if at times in these pages I seem prolix and trivial. Only the practitioner who has been obliged to discover these little devices and "knacks and dodges," one by one, at the expense of time and annoyance to himself and discomfort to the patient, will appreciate that they are by no means trivial or unimportant to the successful practice of gynecology. A physician who has once burned the labia of a patient with iodine, or worse yet, with carbolic or nitric acid, because he had not learned the precise manner by which to avoid such an accident (and such knowledge does not come by intuition) will realize how necessary it is to know even the most trifling points in these matters.

Escharotics.—Of these agents the nitric acid is undoubtedly the one most commonly used. They are all applied to the cervix alone, to the vagina only when the same condition exists there which called for their application to the cervix, viz., malignant disease (epithelioma).

Venereal warts on the cervix or in the vagina, so-called "acute condylomata," should be touched with fuming nitric or saturated solution of chromic acid, which will cause them to shrivel. In this connection, I may state that Dr. Piffard, of New York, reports the speedy disappearance of these growths under the combined local and constitutional use of fluid extract of thuya occidentalis (tamarack); the warts are painted every day with the pure fluid extract, a wash or injection of the same, one drachm to the pint, is ordered, which is also to be applied on cloths continually if the warts are external, and twenty drops of the extract are given internally *ter die*.

A saturated solution of chromic acid in water (or it may be diluted as appears advisable), a solution of bromine in alcohol 1 : 5 or 10, a saturated solution of the pernitrate of mercury, are generally employed in malignant disease only. Formerly the solution of the nitrate of mercury was much used by gynecologists in the treatment of so-called "ulceration of the neck of the womb;" but since we have learned through

Emmet that "ulceration" is in the large majority of cases due to the eversion of the mucous membrane of the cervix through an unhealed puerperal laceration of that part, the red everted cervical mucosa simulating an ulcer, we have recognized that the conversion of the normal or merely hyperplastic and slightly eroded mucous surface into a dense cicatrix is not the proper way of healing this affection; and the progressive part of the profession have ceased applying strong escharotics to these cases, except in unusual hyperplasia of the cervix. In the comparatively rare cases of superficial epithelial erosion of the cervix, especially if associated with papillary or follicular hypertrophy, the pernitrate or chromic acid solution may be used with advantage; but generally the pure nitric acid will suffice, and it will often do good in superficial epithelial cancer of the cervix. The superficial, merely astringent, application of strong nitric acid to the hyperplastic, suppurating, everted mucous membrane of a lacerated cervix will often do great good by constricting the tissues and preparing them for the operation of trachelorrhaphy.

The strong escharotics must be applied only at certain intervals, varying in accordance with the rapidity of separation of the slough and the necessity for a repetition of the cauterization; generally not oftener than once, or at most, twice a month. If applied only superficially with a stick, nitric acid may be repeated every week until improvement ensues; but if the application be so deep as to produce a slough, the same rule applies as to the other escharotics. If the escharotic (which in such cases should be only the nitric or dilute chromic acid) is applied to a superficial ulceration of the cervix, it is desirable to avoid the formation of a deep slough and consequent cicatricial tissue; such applications should, therefore, be merely momentary, be made with an absorbent substance, as a wooden stick, and should not be repeated oftener than once or twice at intervals of two to four weeks. When, on the other hand, it is intended to destroy as much of the cervix as possible (*e.g.*, in malignant disease), the applications of the escharotic should be not only thorough and long-continued, with an excess of the agent, but repeated as soon as the slightest evidence of the return of the disease shows itself. The strength, frequency, and thoroughness of these applications must, as in every therapeutical measure, be regulated by the peculiarities and exigencies of each individual case, and can be learned only by experience.

If the cervix or diseased part of it, or the vagina, can be conveniently exposed through the cylindrical speculum, this is unquestionably the most convenient method of applying the escharotic. A stick of hard rubber, twelve inches in length, and with a screw-spiral at its smaller end (see Fig. 87), is a convenient instrument for all fluid applications. A bit of absorbent cotton is tightly wrapped about the screw end (in case of an escharotic *very* tightly so as not to absorb too much fluid; in milder agents only tightly enough to prevent its slipping off) and dipped into the fluid; when sufficient has been taken up it is carried through the speculum against the cervix and the whole diseased surface thoroughly mopped with it. If the surface bleeds very readily, the stick should merely be pressed against it,

not rapidly moved, so as not to excite hemorrhage. Every nook and crevice of the diseased surface should be thoroughly touched and the stick passed as far up into the cervical canal as may appear desirable, in any case stopping short of the internal os, unless the special indication exists for the cauterization of the uterine cavity, which procedure requires other preparations and will be discussed later on. If it appears necessary, the stick may be dipped again into the fluid and the cauterization repeated, until a sufficiently deep eschar seems to have been formed. All excess of fluid should then be mopped up on absorbent cotton carried in by long uterine dressing-forceps. If a very thorough effect is desired it is best not to neutralize the excess of fluid by an alkaline solution ; if the effect is to be but superficial, as should always be the case in simple erosion of the cervix, such neutralization is always indicated, and can be obtained by introducing a solution of bicarbonate of soda or simple water into the speculum by a syringe, or on cotton by forceps ; the excess of water is caught in a cup as it flows out of the speculum. It should be well understood that when such a superficial effect only is desired, the escharotic should not be conveyed on a cotton-wrapped stick, but on an absorbent wooden stick which takes up all excess of the fluid (such as a match held in the dressing-forceps). When the cauterized surface has been wiped dry, a tampon, covered with vaseline or sweet-oil, or common lard, is introduced through the speculum and held gently but firmly against the cervix with the closed dressing-forceps, while the speculum is rotated and withdrawn. This tampon is to be removed by the string attached to it in twenty-four hours, and tepid injections, perhaps with the addition of carbolic acid (one per cent.), made once or twice a day until the slough separates. A specular examination, made at intervals of three to four days, will disclose this occurrence, which generally calls for the occasional application of some mild caustic or astringent solution (as solution of nitrate of silver, sulphate of zinc, or tannin and water or glycerine) as hereafter to be described, until the surface has completely healed over. These rules apply equally to a malignant ulceration, in which only temporary relief is expected, and to superficial erosion in which a complete and permanent cure is aimed at. Of all these agents the pure nitric acid and the saturated solution of the chloride of zinc, while the most sure and efficacious, are at the same time the least injurious.

For it should be remembered that the toxic effects of two of these remedies, the chromic acid and the pernitrate of mercury, may not be confined to the local destruction of the diseased tissue : the chromium and the mercury may be absorbed and produce severe constitutional symptoms ; the chromium, collapse, vomiting, and purging ; the mercury, salivation. Care should therefore be taken not to continue the application of these two agents too long or too thoroughly, and to remove all excess as soon as the cauterization is accomplished. While the chloride of zinc acts best if applied on wads of cotton soaked in the solution (saturated or equal parts) squeezed dry and kept in apposition to the diseased surface for three or four days, the chromic acid, bromine, and mercury are best

applied merely as above directed, the excess neutralized and the spread prevented by oiled tampons. The chloride of zinc is generally applied on cotton wads, as just described, after the curetting or excision of cancerous tissue from the cervix uteri. The wads must be squeezed thoroughly dry, and are packed tightly with the forceps into the cavity left by the excised growth. To prevent any possible oozing on and cauterization of sound tissue, the vagina is previously sponged out with a saturated solution of bicarbonate of soda and subsequently filled with tampons soaked in this solution. In this manner all excess of the zinc-chloride is neutralized.

The danger of leaving the strong chromic acid solution in prolonged contact with the diseased surface in this manner has already been illustrated while speaking of the application of solid substances to the cervix. The slough from these escharotics generally separates in a week; that of chloride of zinc, chromic acid, and bromine is dry, that of nitric acid usually soft and moist. No effort should be made to detach the slough by force, other than such as the vaginal injections exert.

A possible danger during the separation of the slough of an escharotic should be mentioned, viz., the chance erosion of a blood-vessel and severe hemorrhage. Directions (such as introduction of cotton, pressing an abundance of cotton against the vulva, keeping the thighs together, elevated hips, low head, etc.), should therefore be left with the attendants, in case such a hemorrhage should suddenly occur and its possibility be provided for by the physician. The manual compression of the abdominal aorta through the abdominal wall or the rectum should be borne in mind by the physician as a means which may possibly alone arrest the hemorrhage in such a case. Such hemorrhages may at times be very profuse, especially if the escharotic has been carried up into the cervical canal. The solid or pulverized agents are more liable to be followed by deep sloughing and hemorrhage than fluids.

The directions given above apply equally to the use of the fluid escharotics through a bivalve or Sims' speculum. But additional precautions should be observed to protect the sound parts from the caustic by packing cotton, best soaked in solution of bicarbonate of soda and squeezed dry, underneath the cervix so as to catch any fluid which may flow from the diseased surface. Or, the cotton may be soaked in sweet-oil or covered with lard. This cotton is snugly packed under the cervix with dressing-forceps. If the escharotic is applied on an absorbent wooden stick, it is generally unnecessary to thus protect the sound parts.

At the present day our knowledge of the benefit to be derived by scraping away the exuberant cancerous granulations with a sharp scoop, and of our inability to safely destroy the whole disease by even the most powerful escharotics, renders it unnecessary to use agents which will produce sloughs the extent of which cannot be foreseen. The use of the acid pernitrate of mercury and of caustic potash in cancer of the cervix uteri has therefore been abandoned by the majority of gynecologists, and only those escharotics, like the chloride of zinc, bromine, chromic and

nitric acids, have been retained, the effect of which can be better estimated and controlled.

Caustics; Astringents and Styptics; Alteratives; Hydragogue; Emollients; Narcotics.

I have grouped all these classes of fluid remedial agents together because, being milder in their character, they are all introduced against the cervix or vagina in very much the same manner, viz., by being poured into a cylindrical speculum or applied on cotton tampons left *in situ* for several hours or longer.

For the application of fluids of milder character, the cylindrical speculum is *the* instrument. Not only that it permits the touching of the cervix, for this can be done equally well and safely through the bivalve and Sims, but chiefly because its tubular form allows the fluid to be introduced more conveniently and brought in contact with every portion of the vaginal surface, by simply pouring a sufficient quantity into the speculum and successively bathing the whole canal in the fluid. This is done by gently rotating and withdrawing the speculum while a cotton-wrapped stick distributes the agent against every portion of the vaginal mucous membrane until the speculum is almost withdrawn from the vagina. The tube is then gently reintroduced up to the cervix, and the fluid contained in it emptied into a cup by gently depressing the mouth of the speculum. A tampon soaked in glycerine, or smeared with vaseline or some other emollient, is then introduced nearly to the cervix and the speculum withdrawn. If it is desirable to cover the tampon with a medicinal substance, such as an astringent powder or solution, in addition to the agent introduced by the speculum, the tampon can be introduced quite as well through the tube as through a Sims or bivalve. Or the powder may be sprinkled into the tube and retained by a tampon, as already described.

Some of the stronger fluid caustics and astringents are not generally poured into the speculum as described, but being used chiefly as applications to the cervix are applied directly to the diseased spot by a cotton-wrapped stick; these are pure carbolic acid, iodized phenol, pyroligneous and acetic acids, pure tincture of chloride of iron, and solution of persulphate of iron, saturated solution of alum, and copper and zinc sulphate. Others again, being intended to remain long in contact with the part for which they are specially designed, are applied on the end of or in the substance of cotton tampons; such are the majority of the other agents mentioned in the list. Generally, however, the fluid is first brought in contact with the vaginal interior by being poured into the speculum (which doubtless is the more effectual method) and the effect assured by introducing a tampon saturated in the same fluid. These tampons are allowed to remain from twelve to twenty-four hours, and their removal is generally followed by the cleansing of the vagina by some mild astringent injection or by the hot vaginal douche, as already described. The repetition of these applications depends entirely upon the gravity of the case and

the judgment of the physician. The average frequency will be stated under each separate agent.

Caustics.—I have already stated that four of the five caustics included in my list, viz., pure carbolic and acetic acid, the iodized phenol, and pyroligneous acid, are too powerful to be applied indiscriminately to the cervix and vagina, and that their use is limited to conditions of certain portions of these organs in which a positive caustic effect is desired; to these parts the caustic is applied by means of a cotton-wrapped stick, and the excess at once removed, as prescribed for escharotics.

The *indications* for these strong caustics are chiefly erosions of the cervix and lips of the external os, in which the papillæ and areolar tissue are more or less hyperplastic, the blood-vessels dilated, and the reparative power impaired. The stimulus of these active agents sets up fresh reparative action after the separation of the superficial slough, and this process is assisted by the subsequent local employment of mild astringent solutions. The condition thus described is most commonly met with in lacerated cervices with everted lips, and the treatment is then less curative than preparatory to the plastic operation. *These strong caustics should not, as a rule, be applied oftener than once, rarely twice, a week.* In the interval, local astringents (to be described hereafter) may be used through the speculum, and mildly astringent injections should always be advised. Milder solutions of these caustic fluids are not generally used, except of the carbolic acid, which is so popularly employed in very dilute condition as a vaginal injection. The acetic and pyroligneous acids, and the iodized phenol owe their chief utility to their powerful caustic effect, and this is manifest only when the agent is applied pure or in a highly concentrated state. Strongly diluted, the effect would be no better and no worse than ordinary carbolic or vinegar injections. Each of these agents has its advocates, who prefer it to all others. I, for my part, have found the iodized phenol to act more efficiently and kindly than the others, and therefore use it almost exclusively as a caustic to an eroded cervix where the nitrate of silver solution is counterindicated or fails.

I have thus far omitted to include the nitrate of silver in the discussion of strong caustics, because I wish to devote a separate paragraph to this, in my opinion, most valuable of all true caustics, astringents, and antiphlogistics. While the caustics already mentioned are beneficial only when applied pure, and are, as a rule, available only when a limited space is to be cauterized, the nitrate of silver exerts its most beneficial effect in gynecological practice chiefly when used in comparatively mild solutions, and applied to the whole cervix, vagina, or vulva. I have already expressed my opinion of the solid stick as an application to the cervix. A saturated solution would not be much better. But solutions ranging from one drachm to ten grains to the ounce have a utility and an influence peculiarly their own, which is possessed and exerted to a like degree by no other caustic or astringent.

In acute or subacute vaginitis, chiefly if of venereal origin or in intensity resembling that disease, with highly congested mucous membrane of

vagina and vulva and a greenish yellow, pungent discharge, I know of no application which will so soon allay the hyperemia and control the secretion as a solution of the nitrate of silver of the strength of thirty grains to the ounce. The erosion of the cervix, so commonly met with in these cases if they have existed longer than a few days, is treated and cured by a solution of forty to sixty grains to the ounce.

Be it well understood that not every such acute or subacute vulvo-vaginitis with highly congested mucous membrane and purulent discharge, is due to venereal infection. I have seen severe instances of the kind in virgins, who besides were entirely above suspicion. An exposure to cold during menstruation, an overexertion, may bring on an acrid uterine discharge, which erodes the lips of the os exactly as the upper lip is eroded by a discharge from the nostrils during a violent coryza, and this discharge, as it flows toward the vulva, infects in turn each portion of the vaginal tract, and finally the vulvar surface. A positive diagnosis of gonorrheal vaginitis must usually be made more on the strength of the antecedents and character of the patient, and on the admitted or suspected possibility of such an occurrence, than on the physical appearances. Thus, recently a woman presented herself to me for a profuse leucorrhea, which she said had existed for about three weeks. I found an acute vaginitis of the most virulent type, with a profuse, offensive greenish discharge, which in its intensity so much resembled gonorrhea that I could not repress my conviction that it really was such. The patient was a respectable married woman, and disclaimed with perfect ingenuousness any knowledge of the cause of this discharge. Incidentally she mentioned that her husband had been away six months and had only returned three weeks ago, shortly before the discharge appeared. The coincidence between his return and the vaginal discharge, I am convinced, was not accidental, and the etiology of the unquestionable gonorrhea was revealed.

After this digression, which seems to me not out of place in a discussion on the treatment of vulvo-vaginitis, I will describe the manner in which I am in the habit of applying the solutions of nitrate of silver of various strengths to the cervix and vagina. If the speculum (either variety) reveals an erosion of the cervix, I touch the abraded spot gently but thoroughly with a cotton-wrapped stick dipped in a silver solution of ʒ j. to ℥ j. If there is no vaginitis present, I simply dry the cervix with cotton held in the dressing forceps, and push a tampon covered with vaseline up to the cervix and withdraw the speculum. The whitening of the cauterized surface through the formation of an albuminate of silver is a proof of the disintegration or desquamation of the epithelium. A perfectly healthy mucous surface with a sound epithelial covering remains unchanged by the application of a mild solution of nitrate of silver. This white color thus shows the extent and degree of the inflammation. If, however, the vagina is congested and inflamed, especially if the epithelium appears swollen or abraded, I follow the application to the cervix by pouring about a teaspoonful of silver solution of ʒ ss. to ℥ j. into the speculum, and then gently withdrawing the tube, I swab the vaginal walls, as

they successively become exposed, with the solution, until the speculum is almost out of the vagina. By then depressing its funnel-shaped mouth the fluid is made to flow out into a cup, and any excess of the caustic thus removed. The speculum is then reintroduced almost to the cervix, and a conical tampon thoroughly covered with vaseline inserted, and the speculum removed. It is always well to protect the clothing of the patient from stains of the silver by packing cotton-wool between the nates and against the perineum, which will absorb the almost unavoidable oozing of a few drops from the vagina when the speculum is withdrawn.

If the vulva and vaginal orifice are also inflamed and abraded, as is usually the case when the discharge is acrid, these parts are gently painted with a silver solution of gr. x. to ℥ j., and a strip of cotton-batting smeared with vaseline is placed between the nymphæ and pressed into the vaginal orifice. This last strip is removed by the patient at the next micturition, the vaginal tampon not until twelve to eighteen hours later; mild astringent vaginal injections are then made two or three or more times daily, until the repetition of the silver process in three to six days. In aggravated cases the silver is applied every other day, each alternate application being of a milder solution, say gr. xv. to gr. xx. instead of ʒ ss. to the ounce. If a few weeks of this treatment do not show marked improvement, it is necessary to try some other agent to the cervix, and the best is then undoubtedly the fuming nitric acid superficially applied by a wooden stick. The iodized phenol and the saturated solution of chromic acid may have a trial also, if the nitric acid fails; and it certainly must be an obstinate erosion which resists all these remedies perseveringly applied. When the erosion is that of an everted cervical mucous membrane, however, nothing but the repair of the laceration by operation will fully cure the case. It is rare that a vaginitis does not yield to the silver solution, if it is applied with sufficient frequency and perseverance; the relaxed condition of the vaginal mucous membrane usually following the acute stage requires other remedies, however, and here the astringents to be mentioned in the next section come into play. Should the silver, contrary to expectation, fail, the alum or zinc or copper solutions (ʒ ss. to ʒ j. to ℥ j.), or tannin in powder or in saturated solution in water or glycerine, or dilute solution of tincture of chloride of iron (ʒ j. to ℥ iv.), or the pure fluid extract of hydrastis Canadensis or eucalyptus globulus, painted all over the cervix and vagina, may effect a cure. The greased tampon and cotton strip described above are used for the purpose of preventing friction of the freshly cauterized surfaces and probable abrasion of the epithelium; this precaution should never be neglected.

In very virulent vaginitis, especially if of specific origin or characterized by distinct enlargement of the papillæ (so-called "granular" vaginitis), it is often difficult to cure the disease because certain portions of the vaginal tract are not reached by the caustic; small crevices between the rugæ escape uncauterized and form the foci for a renewal of the infection. This is due to a want of sufficient dilatation of the canal to efface these inequalities, and may be overcome to a certain extent by using a large speculum.

But this is often not practicable if the vaginal orifice is small, and if the canal is very large and rugous even the largest speculum in use will not distend its walls to their utmost. To obtain this desired distention and inspection of the vaginal canal a very excellent plan has been suggested by Dr. Palmer, of Louisville. He places the woman in the knee-breast position, elevates the perineum with the Sims, and then finds the vagina expanded like a balloon, with every wrinkle and fold effaced. By now swabbing its walls with the caustic he is absolutely certain that no spot, be it ever so minute, escapes. The excess can be mopped out or drawn up by a syringe, and the tampon is then introduced with the forceps, and the Sims removed. I have found this method excellent in cases where the ordinary plan through the tubular speculum had failed. It can also be employed with any of the fluid astringents, which may be poured into the expanded vagina until it is filled to the brim and retained there so long as the patient can endure the uncomfortable position. A very powerful astringent effect can evidently be exerted on the vaginal walls in this manner, which may prove beneficial in relaxation and more or less complete prolapse (rectocele, cystocele) of that organ.

Astringents and Styptics.—I have already stated that certain of the stronger agents of this class are merely painted on the diseased part through a speculum; the excess is then removed and an astringent or emollient tampon introduced. If a styptic or particularly strong astringent effect is desired, the part of the tampon to be placed in apposition to the diseased surface is soaked in the agent. These applications may be made through either form of speculum which best exposes the part to be treated. The tincture of the perchloride and the solution of the persulphate of iron may be applied pure or mixed with a proportion of glycerine varying with the intensity of the effect desired. A mixture of bismuth and glycerine (it should be made of the thickness of cream) is applied to the cervix on absorbent cotton, and is particularly recommended for "ulceration" (I suppose erosion is meant) by Dr. Suesseroth, of Chambersburg, Pa. A saturated solution of resin in alcohol (known as James' styptic) is used chiefly in cases of hemorrhage from carcinoma of the cervix. It is applied on cotton firmly pressed against the bleeding surface until the alcohol evaporates and leaves the tenacious resinous coating as a hemostatic, and this cotton is then retained by a dry tampon.—It may not need renewal at all, or a recurrence of the hemorrhage may call for a fresh application at any time. The dry tampons should in every case be removed in twenty-four hours, the styptic cotton not until it has of itself become detached.

Dry styptic cotton can be easily prepared and kept on hand, by saturating the cotton with a solution of the perchloride or persulphate of iron (the strength of the solution varying with the effect desired; styptic, equal parts, or stronger; astringent, one tablespoonful to one-half pint or pint of water), expressing the excess, and drying it. This cotton can be applied either in small pledgets directly to the affected part, or in large tampons filling the whole vagina. Other astringents and styptics, such as tincture of iodine, alum, zinc, copper, tannin, can be prepared in the same

manner, and kept on hand for use; the solutions should be alcoholic or aqueous, for glycerine does not evaporate.

Aside from the styptic effect which these agents all possess in a greater or lesser degree in accordance with the strength of the application, their chief utility in gynecological practice is as astringents. And the one great indication for the use of local astringent applications is a hypersecretion from the mucous membrane of the genital tract. This hypersecretion may be due to an acute hyperemia or inflammation, as in acute vaginitis or endometritis, or depend on a chronic relaxed and dilated condition of the blood-vessels and glands. In either case the choice of astringents will differ, the acute stage requiring first the application of caustics, as already described in the previous section, and the chronic condition calling for the persistent use of the various astringents enumerated in the list. These two stages may merge one into the other, the acute into the chronic or (more rarely) the reverse by renewed irritation, or the chronic leucorrhea may depend upon general debility and loss of tone. In the latter case the administration of general tonics will be required in addition to local astringents; either alone will prove insufficient.

The solution of tannic acid in glycerine or water is one of the most efficient astringents in use in gynecological practice. As a hemostatic the dry powder alone is preferable. When the astringent effect chiefly is desired, a solution of tannin in water (1 : 4 or 6) will act better than if glycerine be used as a vehicle; but, if the condition be an acute or subacute one and an antiphlogistic and emollient effect be intended, the solution in glycerine (equal proportions) should be used. If burning or pain be present, the addition of iodoform to the tannin and glycerine solution (iodoform ʒ ij. to ʒ iv. to tannin ℥ j.) will prove useful, the tannin masking to some extent the disagreeable odor of the iodoform. Or laudanum or tincture of hyoscyamus may be added to the application in proportions of ʒ j. to ℥ j. of mixture.

The best way of applying any of these astringents to the whole vaginal tract is to pour a teaspoonful or more of the mixture or fluid into the tubular speculum, and then bring each part of the vaginal wall in contact with the astringent by slowly withdrawing the speculum and swabbing the parts successively with a brush on a long handle or a cotton-wrapped stick. The excess may then be allowed to run out into a cup, or, if it be slight, is left in the vagina, and a conical tampon soaked either in pure glycerine or in the same solution is introduced, held fast by the dressing-forceps, and the speculum removed.

Thus the mixture of the tincture of the perchloride of iron and liquor ferri persulphatis with glycerine (one drachm to one ounce, or weaker), the glycerole of tannin, alum, or bismuth (used on account of the supposed specific effect of bismuth on the hypersecretion of mucus), the decoctions of oak- and willow-bark, the fluid extracts of hydrastis and pinus Canadensis and of eucalyptus, are applied to the vaginal mucous membrane. If the solution be a very strong one, it is generally best not to leave it in contact so long as would be the case if a tampon soaked in the same were

introduced, but to apply instead a tampon soaked in a milder solution or in glycerine, or covered with vaseline. It is important that the cord attached to the tampon should be a stout one, since it might break in the attempt to remove the cotton from the contracted vagina and produce inconveniences to be described hereafter. If it be unnecessary to apply the astringent so thoroughly, or if a cylindrical speculum be not at hand, the astringent solution can be applied by soaking a tampon in it and introducing it through either of the three varieties of specula, leaving it *in situ* for at least twenty-four hours. Care should be taken that the excess of fluid be thoroughly expressed from the tampons before they are crowded into the speculum, in order to prevent the escape of the astringent from the mouth of the speculum and the soiling of the linen by such of them as stain (iron, tannin, oak-bark decoction, etc.).

These astringent applications should be repeated three times a week; in very obstinate cases, or where remedies of only moderate strength can be employed, every day, until improvement is manifested. The addition of a narcotic (tr. opii, hyoscyami, or conii) to the astringent solution in which the tampon is soaked is always indicated when pain exists, or the application is likely to be followed by pain. The quantity of the narcotic need not be estimated to a nicety, as comparatively little is absorbed from the vagina; a teaspoonful of either of the three agents mentioned will ordinarily suffice for a tampon.

The fluid extracts of pinus Canadensis and eucalyptus globulus may be used either pure or mixed with equal parts of glycerine. They are beneficial chiefly in cases of acute and subacute congestion of the cervix and vagina, as in papillary erosions, endotrachelitis and cystic hyperplasia of a lacerated and everted cervix. The pure extract should be painted over the cervix and a tampon soaked in the glycerine solution then applied. On the recommendation of Dr. Andrew F. Currier, late house-surgeon at the Woman's Hospital, I have recently been using a solution of equal parts of eucalyptus and glycerine on tampons as an anesthetic in chronic pelvic cellulitis and ovaritis, but so far I cannot say that I have witnessed the decided beneficial effects reported by Dr. Currier.

Pure vinegar has chiefly a styptic and disinfectant property; it can be used in default of something better for either of these objects; either through a speculum or on tampons.

It is a good rule, after using any local remedy for a reasonable length of time without appreciable benefit, either to interrupt it for a short time to give the *vis medicatrix naturæ* an opportunity to assert itself, or to change the remedy.

An obstinate leucorrhea may require the whole list before the proper agent is found. An old chronic leucorrhea of this character can, in my opinion, be cured only by the persevering and frequent local use of astringents, through a speculum, together with the hot vaginal douche, as already described. Simple astringent injections are utterly valueless in a curative sense; they merely keep the affection at a standstill, and insure cleanliness.

It is almost needless to say that if an endometritis exists, it must be treated in conjunction with the vaginal leucorrhea and, if possible, cured, before a permanent improvement can be expected in the latter.

Alteratives.—Iodine and its compounds are the only real alterative and absorbent agents which are directly applied to the cervix, always excepting the hot vaginal douche. The effect derived from these applications is on the one hand that of counter-irritation to the inflamed and congested cervix and vaginal mucous membrane, and of contraction of the capillaries; and on the other, that of stimulation of the lymphatics to absorb the hyperplastic tissue in areolar hyperplasia and the exudation of plastic lymph in pelvic peritonitis and cellulitis. It is, therefore, in areolar hyperplasia (or chronic subinvolution, for I believe deficient puerperal involution to be, at least, a frequent starting-point of true "areolar hyperplasia") of the whole uterus, or cervix alone, in subacute pelvic peritonitis and cellulitis, and in the so-called "chronic" forms of these latter affections of the pelvic peritoneum and cellular tissue, that we should use these local counter-irritants and alteratives, and may frequently expect material benefit from them. By the persistent application to the vaginal roof and cervix, once or twice a week for several months, of these agents, chiefly the pure tincture of iodine, I have seen most decided diminution in size of a hyperplastic uterus with marked amelioration of the various distressing hystero-neuroses so characteristic of this affection, and gradual softening and absorption of the exudation in not too old cases of pelvic peritonitis and cellulitis. I cannot say as much for the dispersion of old adhesions and callosities of the parametran tissue, which by their pressure on nerve-filaments and distortion of uterus and ovaries produce many of the annoying aches and pains complained of by the victims of "chronic pelvic peritonitis and cellulitis;" these really cicatricial tissues remain unaffected by all alteratives, and the most one can hope to do with these applications is to relieve any accidentally accompanying edema or intercurrent exacerbation of the old affection. This can usually be done, and I have therefore always felt myself justified in extending to the patients a prospect of relief, although small hope of a perfect cure. I have in course of time come to look upon the periodical and systematic use of alteratives to the cervix and vaginal cul-de-sac in these affections as so beneficial, in conjunction with glycerine and hot injections, that I rarely treat a case of areolar hyperplasia or subacute or "chronic" pelvic peritonitis or cellulitis otherwise than by the application with a swab once or twice a week through the speculum of pure tincture of iodine to the cervix and vaginal vault, followed by a glycerine tampon, and always accompanied by the hot vaginal douche. If the iodine is used but once a week, on one or both of the remaining alternate days, I introduce a tampon soaked in a mixture of tincture of iodine and glycerine (1 : 4), or iodoform and glycerine (1 : 8 with one drop of oil of peppermint or balsam of Peru added for each fluid drachm, to correct the odor), or of iodoform and chloral in glycerine (iodoform ʒ j., chloral gr. xx., glycerine ℥ j.), and leave it *in situ* for twenty-four hours. The addition of the chloral, besides most efficiently deodorizing the iodoform, is

especially beneficial as a local anesthetic for the pelvic neuralgiæ so generally complained of in chronic pelvic cellulitis and peritonitis ; it acts also as a mild caustic on cervical erosions. Of late, I have found better effects from a mixture of tincture of iodine and tincture of aconite root, equal parts, both to the vaginal vault and abdominal wall. And the frequent, even daily passage of a mild constant current of electricity through the pelvic organs (one pole in the vagina, the other by a large, flat, wet sponge on the abdomen) has a marked effect in allaying pain, and eventually dispersing exudations. By the persistent use of these remedies (by persistent I mean for from three to six months, and we should expressly caution the patients not to expect even the sign of an improvement sooner) we may confidently hope to relieve our patients at least, if we cannot actually cure them. As any relief is grateful in these distressing affections, of which the hyperplasia particularly exerts a most deleterious effect on the nervous system, even this prospect cheers the patient and is worthy of realization. The patient should, however, be warned that a cessation of the treatment after a merely temporary improvement will invariably entail a return of the symptoms and a recommencement of the treatment at the *status quo ante.*

A fresh cellulitis of only a few days' or a week's duration should not be treated by the local application of alterative drugs. So long as the exudation is markedly tender to the touch and the vaginal temperature elevated, hot injections and abdominal poultices, perhaps preceded by a blister, are the proper treatment. Only when all acute symptoms have subsided may the dispersion and absorption of the exudation be aided by remedies described in this section.

I have thus far spoken only of the tissues to which the alterative is directly applied. But of scarcely less value is their use in that still more harassing and even less curable affection, subacute and chronic oöphoritis. The chronically congested and hyperesthetic ovary becomes in time hyperplastic, its stroma sclerifies (interstitial oöphoritis) and the constant wearing, dragging pain in the groin and back makes life a burden to the sufferer. Often the ovary is embedded in more or less fresh plastic exudation, the pressure of which causes flashes of pain to radiate all through the body. Now, while but little more than slight temporary relief can be afforded by the local application of alteratives and counter-irritants to the region of the ovary, abdominal or vaginal, when that organ has undergone sclerotic degeneration, there is no doubt whatever that much good may be done to the congested, subacutely inflamed organ, whether it be enclosed in plastic lymph or not, by the frequent systematic applications above mentioned. The employment of counter-irritation by blisters and iodine to the abdominal ovarian region is at the same time decidedly advisable. If an ovary is prolapsed, and therefore in close contiguity to the vaginal pouch, the application will be still more effective. I can honestly say that, both in hospital and private practice, I have many times relieved patients of their ovaralgia dependent on congestion and subacute inflammation of the organ, by the *frequent, persistent* use of

the above remedies, and I have relieved some of them not only temporarily, but if they were as persevering as they were directed to be, permanently. I claim to *cure* these cases quite as little as I do a hyperplasia or cicatricial cellulitis, but I know that they can be immensely and often permanently relieved in the manner indicated if their perseverance will only keep pace with that of their physician. Unfortunately such cases soon tire of the routine, although the treatment is neither very painful nor distressing, and skip a few months after the first improvement, only to return again and again. Those who have persevered have never had occasion to regret it.

I have spoken of the local influence of alteratives only in describing the effects to be obtained by their use. In the main, this may be considered the chief benefit, especially as regards the tincture of iodine; but there can be no doubt that it, and particularly the iodoform and iodide of potash are, to a certain extent, absorbed and act through the vascular system. But the power of absorption of the vaginal mucous membrane is vastly inferior to that of the endometrium or rectal mucosa.

The tincture of iodine may be applied in two ways: mixed with glycerine on a cotton tampon and left in the vagina for twenty-four hours, or pure against the cervix and vaginal pouch by a cotton-wrapped stick. The first method requires no other explanation than that it is done in the usual way, and that a second dry tampon should be placed over the first to prevent the escape of the fluid on the delicate vulva.

The application of the tincture of iodine on a cotton-wrapped stick may be made through a cylindrical, a bivalve, or a Sims speculum. Through a cylinder one cannot be quite sure that the iodine reaches the exact spot in the fornix vaginæ, or indeed the fornix at all; for the cervix fills up the lumen of the speculum and there is no room to crowd the stick with iodine beyond it; besides, by doing so, the fluid would be squeezed out and flow down the speculum. Or the vaginal walls prolapse in the speculum and intervene between the applicator and the fornix. However, for painting the cervix alone, the cylindrical speculum answers very well. Through the bivalve the same objections hold good, perhaps to a lesser extent. But I, habitually using as I do the Sims, prefer it decidedly for this maneuvre also, and have no difficulty in executing it, even without a nurse. An accident to be avoided in making this application is to bring the iodine in contact with the sensitive vaginal orifice and vulva, which may readily occur if the soaked swab is carelessly introduced or so freely saturated as to allow the excess of iodine to flow along the crease in the anterior wall and on the vestibule. While the iodine produces scarcely more than a slight smarting when applied to the mucous membrane of the vagina proper, it gives intense pain when it touches the thinner and more sensitive covering of the vulva, particularly the vestibule. And that this readily happens, unless proper precautions are taken, is at once apparent on considering the peculiar position occupied by the patient, and the downward incline of the vaginal canal from within outward. After introducing the Sims, and before making the application, it is well, therefore, to pack

some absorbent cotton against the bulb of the urethra and vestibule as a protection to these parts, and, what is even more important, the peculiar upward twist described on page 85 should be given to the speculum so as to place the point of the internal blade decidedly lower than the perineal angle of the speculum. In this manner the inclination of the vaginal canal is reversed, and fluids poured into it will flow inward and downward toward the fornix instead of outward and downward, as they ordinarily would in Sims' position. The cervix being thoroughly exposed, the cotton-wrapped end of the stick is dipped in the tincture of iodine (which, like all fluid applications, it is well to keep in a wide-mouthed bottle) the excess squeezed out by gently pressing the cotton against the edge of the bottle, and carefully passed through the vaginal orifice up to the fornix. Whether it is the object to paint the cervix only or the whole fornix, it is advisable to be on the safe side and make the application as thorough as possible. I therefore generally swab the whole cervix and posterior fornix vaginæ until all of the fluid has been expressed from the cotton, thrusting the stick a number of times rapidly and gently against different parts of the fornix. To make the application thoroughly can do no harm, and it is evident that the greater the surface covered by the iodine in a case of old pelvic cellulitis the more efficient will the application be. After such an application the vaginal pouch and cervix are almost black in color, and the external os is difficult to distinguish. It is therefore advisable to make any applications to the endometrium, which may also be required, previous to this swabbing. When the application is completed, the stick is removed with equal care, in order not to touch the vulva, and any positive excess of fluid iodine wiped away by cotton on the dressing-forceps, which it is well to have at hand in case the fluid should accidentally flow toward the vulva in spite of all precautions. A tampon thoroughly soaked in glycerine and expressed is then introduced to the fornix by the dressing-forceps and the speculum removed. In removing the Sims after a tampon has been placed it may be as well to mention here a precaution, which will be referred to again, viz., to keep the point of the vaginal blade of the speculum backward, and the whole blade in close contact with the posterior wall until the instrument is entirely withdrawn. If the point of the vaginal blade is directed forward while being withdrawn, the tampon will be lifted out with it.

The glycerine tampon is removed on the next day and the usual hot vaginal injection made. It is scarcely necessary to tell the practitioner that an injection, hot or otherwise, is not to be used when a tampon is in the vagina ; but it is by no means unnecessary to tell the patient so, since very few will consider the tampon an obstacle to the usual injection.

These iodine applications should be made at least once, in obstinate or aggravated cases twice, a week, and even every other day for a short period. But so frequent applications are very liable, in conjunction with the softening effect and pressure of the tampon, to produce excoriation of the vaginal mucous membrane, which is usually not desirable, although on the cervix alone it may do good in areolar hyperplasia. For this reason,

I rarely employ the strong Churchill's tincture of iodine for vaginal applications, having found that it excoriates too rapidly, and thereby obliges an intermission of the applications.

I have been thus explicit in describing the details of this maneuvre, because I have witnessed over and over again the blunders made by my students in the very points cautioned against above (and, indeed, have occasionally myself, when in haste, had the iodine flow on the vulva because I filled the swab too full or neglected the speculum twist or vestibular cotton), and was made disagreeably conscious of the sharp pain unnecessarily inflicted on the patients by the iodine touching the vulva. It is true, the pain lasts but a few minutes, and may be allayed by placing glycerine-soaked cotton between the labia ; but, we are so often obliged to inflict necessary pain on our patients during gynecological manipulations, that it is certainly desirable to avoid doing so unnecessarily whenever possible.

I have never seen any positive unpleasant consequences follow this profuse iodization of the vagina ; still, occasionally, a patient complains at the next visit of having felt some abdominal pain or lost some blood after the last application, and it is best in such cases to make the application very mildly and gently, or substitute the iodoform tampon presently to be described, for one or two visits. At times it is well, as with every species of continuous local treatment in gynecology, to omit all direct applications for one or two weeks and give the patient locally and constitutionally a rest. Often the beneficial influence of the treatment is not experienced until that treatment with its necessary excitement has been discontinued.

The application of *iodoform* to the cervix and vagina in the shape of powder with and without tannin has already been discussed under Solids ; but a preferable method of employing it when an alterative and discutient effect is desired is through a speculum in the form of a solution in glycerine (1 : 8) with the addition of one drop of oil of peppermint, five drops of balsam of Peru, or gr. ij. of hydrate of chloral to the drachm of fluid, as a deodorant. I have already spoken of the relative merits of these three agents as deodorants of iodoform, and will merely repeat that the chloral is the best. This solution, after being well shaken, is applied to the cervix and upper portion of the vagina by a cotton swab, and a tampon is then soaked in the liquid, expressed, and introduced, followed by a dry tampon to prevent the escape of the fluid from the vagina. This application may be repeated every other day, or even every day, the tampon being always retained for from eighteen to twenty-four hours. In the interval the usual hot injections. The iodoform tampon is not in the least painful ; on the contrary, it has a soothing, gently narcotic effect, and is therefore indicated chiefly where dull pelvic pain exists, as in the exudation of old pelvic peritonitis and cellulitis, and chronic ovaritis. The alterative and absorbent qualities of the iodine will exert their influence also in this combination, and may even be of some benefit in areolar hyperplasia. The counter-irritant, stimulant effect of the tincture of iodine is not exerted by the iodoform. The solution of *iodide of potash* is applied on cotton

tampons in the same manner as the iodoform. The solution may be in glycerine or water, or both together. The glycerine is preferable, and the strength should be not more than 3 ss. to the ounce. A stronger solution I have found to cause smarting. It is best prevented from oozing on the vulva by a dry tampon. The cotton should be retained for from eighteen to twenty-four hours, and be repeated every two or three days. In fact, the indications and treatment are precisely the same as when iodoform is used. If the application gives pain, a drachm of tincture of opium may be added to each tampon.

The same rule applies to these two remedies as has already been stated for the tincture of iodine, viz., perseverance. With it much may be achieved in these intractable cases; without it, little or nothing.

The *cantharidal collodion* has been included under the head of Alteratives, because that is really the effect produced by blistering the cervix. It should be applied only to the cervix, never to the vagina, since adhesions between the two parts might otherwise take place. The indication is areolar hyperplasia, particularly the old, sclerotic variety, which refuses to yield to milder measures, and the object that of counter-irritation, depletion, and stimulation to absorption of the adventitious tissue. The collodion is applied with a brush through a cylindrical speculum only, the excess wiped up, and a glycerine tampon introduced. If vesication has not taken place on removal of the tampon after twenty-four hours, the application is repeated, and so on until a decided blister is raised; this is pricked, and daily glycerine tampons applied to increase the watery discharge from the uterine capillaries. When the blister has healed, the application may be repeated, and this treatment may be continued through many months. At the present day, blistering the cervix for hyperplasia is not fashionable, having been supplanted by operative measures, such as amputation; but doubtless it is a beneficial remedy, and should not be neglected when the iodine and other applications mentioned have failed.

Hydragogue.—The only remedy of this class which we use in gynecology is glycerine. The introduction of this remedy into gynecological practice for the express purpose of producing and sustaining a free watery discharge from the hyperemic female genital organs, dates, so far as I am aware, from the new era in gynecology inaugurated by J. Marion Sims. Since his time glycerine forms the inseparable companion of the gynecologist, and undoubtedly deserves the universal esteem in which it is held. Its indications are precisely identical with those which call for a local alterative—that is, all acute, subacute, and chronic inflammatory or hyperemic conditions of the pelvic organs. As an auxiliary to these alteratives it is a specially valuable agent; and its use in conjunction with the systematic hot vaginal douche serves to mollify whatever local irritation the douche may produce, and to intensify its antiphlogistic effects. Almost every application to the cervix, vagina, or endometrium is followed by the immediate introduction of a cotton tampon soaked in glycerine, which is retained for from eighteen to twenty-four hours and produces a profuse watery discharge. Of the prospective occurrence of this dis-

charge the patients should be warned, partly that they may protect their clothing, and partly to avoid a belief on their part that the leucorrhea from which they were probably suffering has been increased by the treatment. The latter reason, it will be observed, is as much in the interest of the physician as of the patient.

Glycerine is applied to the vagina and cervix chiefly on tampons of cotton-wool, which have been soaked in the liquid and squeezed so as not to drip. The best mode of introducing these tampons is always through a speculum, because not only can a larger tampon be used, but the exact location of the plug regulated. Both these points are of importance, particularly the latter, as when it is desired to exert pressure against a particular spot, say behind the uterus in retrodisplacement of that organ or an enlarged ovary. The use of glycerine, to be really productive of benefit, should be even more systematic, frequent, and persistent than that of the alteratives in conjunction with which it is generally used. Glycerine tampons should, therefore, be introduced daily; if two hot injections per day are used, even twice daily, after each injection. Manifestly, but few patients can afford to see a physician twice a day for months to have this done, and perhaps few physicians would care to be saddled with such routine work. A nurse may easily be taught this simple maneuvre, and I have frequently succeeded in accomplishing the object in this way. But comparatively few patients have trained nurses at their disposal; and it has, therefore, been sought to overcome the difficulty by constructing tubes with piston-rods, into which the tampon is put and, the tube being introduced into the vagina by the patient herself, the tampon is expressed and the tube removed. The objection to these tubes is, 1, that their calibre is necessarily so small (the patients are afraid to, or actually cannot, introduce a fair-sized tube) that the tampons are mere apologies, and do but little good; and 2, that many patients are absolutely unable to introduce them, partly through timidity or awkwardness, partly through narrowness and tenderness of the vaginal orifice. Such tubes have been devised by Thomas, Barnes, and others (see Fig. 94), but they have never become really popular, either with physicians or patients. I have always found it possible to instruct patients who had had children, and whose vaginal orifices, therefore, were not too narrow, to introduce an ordinary-sized tampon themselves by assuming the dorsal position with separated thighs and pushing the tampon upward as far as possible with the fingers. But, it is not to be denied that such tampons rarely reached or remained in the fornix vaginæ where they were wanted, and that generally a T-bandage was required to prevent their slipping out of the vagina during walking. Only through a speculum and with a practised hand can a tampon be placed in the fornix and in close apposition with the cervix as it should be.

I shall refer to the subject of tampons more at length in the chapter on that subject. Glycerine injections have been found beneficial in vaginitis and ulcerated conditions of the vagina, acting simply as an emollient with the very slight caustic effect peculiar to glycerine added. The

vagina may, for the same purpose, be bathed in glycerine through a round speculum.

It may be mentioned as a point of practical value, although not quite in place here, that rectal injections of glycerine and water (℥ j. to the pint) will produce an alvine evacuation, when every other form of enema has failed. I have also found enemata of pure glycerine of great benefit in tenesmus and catarrhal proctitis.

Emollients.—The fluid emollients, such as the vegetable oils, chiefly oil of olives and poppies, are but little employed in gynecological practice at the present day, the unctuous substances, especially vaseline, having superseded them. However, in acute vaginitis, particularly the adhesive variety in old women, and in wounds and injuries to that canal, frequent bathing of the vagina with warm oil through a speculum, or the daily introduction of tampons soaked in oil may prove healing and soothing. There is no special advantage in the oil of poppies, except, perhaps, its cheapness ; for it possesses no narcotic properties.

I shall speak of the use of emollient ointments presently, when I have concluded the fluids.

Narcotics.—The indications for the use of narcotic substances as vaginal applications are contained in one word—pain, pain in the pelvic organs. Such pain may exist during acute or chronic inflammation, or as a symptom of cancerous disease. The absorptive power of the vaginal mucous membrane is comparatively slight, but this property is vastly increased when the epithelium is abraded or an actual loss of tissue exists, and the absorbents are laid directly bare. In cancerous ulceration, therefore, local narcotics exert a much more beneficial effect than in areolar hyperplasia or pelvic cellulitis. And equally should more caution be employed as to the dose in the former than in the latter cases. The inconvenience common to the employment of all vaginal tampons, that is, the difficulty experienced by all women in introducing them themselves as often as they should be used, has given the preference to the application of narcotics, as well as astringents to a certain extent, in the form of suppositories, which, so far as narcotics are concerned, may be either used per vaginam or rectum. The latter method is generally preferred, because the greater absorbent power of the rectal mucosa renders the effect a much more rapid and certain one. But there are conditions when the direct application of the narcotic to the cervix seems advisable, and this is especially the case when a mere soothing, only mildly narcotic effect is desired, which will not influence the whole system to a marked degree. Thus, in the pelvic neuralgiæ of areolar hyperplasia and chronic pelvic cellulitis very decided comfort can be afforded the patient by adding one-half to one drachm of the tincture of one of the narcotics (opium, belladonna, conium, hyoscyamus) to the glycerine in which the tampon is soaked, or by dipping the cervical end of the tampon in the tincture. In dysmenorrhea, too, such tampons, especially with belladonna, may relieve the pain, if applied several days previous to the expected flow.

In cervical cancer the hydrate of chloral in solution (one drachm to

the ounce of glycerine, or stronger, if this proves insufficient) is not only an excellent anesthetic but also a disinfectant. A tampon is soaked in a sufficient quantity of the solution and introduced through a speculum up to the cervix, and retained there by a second dry tampon from twelve to twenty-four hours. This application is often the only local application which will give relief in cancer of the uterus, and it is free from the positive narcotic, constipating, and disagreeable after-effects of the only other reliable narcotic application, morphine suppositories. Conium is supposed to have a specially beneficial effect in cancer, but I confess I have not been able to detect its advantage over opium or chloral.

The beneficial effect of iodoform, chiefly in solution with chloral, used in this manner, has already been referred to.

The bromides of potassium, ammonium, and sodium may be employed in saturated or strong solution (ʒ ij. to ℥ j. glycerine and water equal parts) on cotton tampons in those cases where a general soothing effect is desired quite as much as the local anesthesia. Such cases are chiefly those of hysteria dependent on some local disease, mainly hyperplasia uteri. All these narcotic tampons should be retained for at least twelve and generally twenty-four hours, and be repeated daily, or as often as necessity may require. If the circumstances of the patient admit, the regular administration of local narcotics in this manner by the physician, or by the patient herself if she is dexterous enough to introduce the tampons properly, is decidedly preferable to rectal suppositories. Neither the immediate nor ultimate constitutional effects are so marked or objectionable as when the narcotic is absorbed from the rectum.

Disinfectants.—I have introduced these agents into this section for the sole purpose of stating that they may be very conveniently and efficaciously applied on cotton, which is saturated in a solution of the disinfectant (1 to 2 : 100 parts of water or glycerine and water), squeezed dry and introduced through a speculum ; the tampon is removed after twenty-four hours. The use of disinfectants in this manner is indicated after operations on the uterus, cervix, or vagina, or when it is feared that foul discharges from an open wound in either of these parts may be absorbed. There is no actual advantage in one of these agents (carbolic acid, thymol, chlorinated soda, or boracic acid) over the other, although by reason of its want of odor and unirritating quality, the boracic acid is highly praised by some gynecologists. As a destroyer of foul odors the chlorinated soda, or plain chlorine water is, in my opinion, the most efficient and reliable. Care should be taken to try the strength of these solutions on the finger or tongue before introducing them for a longer time into the vagina, where they might easily produce excoriation. The corrosive sublimate solution is not advisable as a permanent application on account of the danger of systemic absorption.

γ. *Ointments.*

The medicinal agents which may be employed rubbed up with lard or some form of cerate belong either to the class of astringents, alteratives,

emollients, or narcotics. Of the astringents, the nitrate of silver, tannin, alum, zinc, copper, and bismuth may be employed, best smeared on tampons of cotton which are retained for twelve to twenty-four hours. The proportions of the agent to the vehicle will vary from ten grains to one drachm to the ounce. I am not aware that the employment of these agents in ointment form offers special advantages over that in solution, when a tampon is soaked in the fluid and left *in situ* for the same length of time. Certain of the alteratives, however, are best employed as ointments, chiefly one which I have not yet mentioned, the mercurial ointment. In conjunction with the unguentum potassii iodidi (℞. Ung. pot. iod., ʒ j. ; ung. hydrarg., ʒ ij.) this ointment is very beneficial in the exudations of pelvic cellulitis, applied on the upper end of a conical tampon and retained for twelve hours. The ointment of the iodide of lead (ʒ ss. to ʒ j. to ʒ j.) may also be used in similar cases in the same manner.

The vegetable narcotics are likewise useful in this manner, the powder or solid extract being rubbed up with lard or vaseline in the proportion of gr. xx. to ʒ j. to the ounce, the strength depending partly on the degree of effect desired and the amount of ointment applied on each tampon. The hydrate of chloral may also be rubbed up and used in this way.

The chief utility of unctuous substances, however, is as an emollient, the principal agent of this class (the ordinary lard having been relegated to poor practice) being the modern cosmetic vaseline or cosmoline, a product of petroleum. It possesses the great advantage of not becoming rancid, is neat and clean, and deodorant and disinfectant in itself. I have already sung its praises as a covering for the finger and speculum in ordinary vaginal examinations. As an excipient for medicinal substances it is decidedly superior to the cerates. But the soothing and healing properties of vaseline render it particularly adapted to those cases of vaginitis in which caustics and astringents have been used (as solution of nitrate of silver) or after active cauterization of the cervix (as with nitric acid or the actual cautery), also after exfoliative inflammation or ulceration of the vagina, in which adhesions are to be prevented. In acute vaginitis an ointment of nitrate of silver in vaseline (gr. x. to xx. to ʒ j.) may be rubbed over the vagina through a cylindrical speculum, and a tampon covered with the same introduced. This application is by some preferred to the fluid already described. But, aside from its advantage over the cerates as a vehicle for medicinal substances, it is chiefly as a covering for tampons in all cases where the hydragogue effects of glycerine are not desired that vaseline is employed. It is always fresh and clean, and keeps indefinitely. If desired, its antiseptic properties may be enhanced by rubbing up five to ten grains of carbolic or boracic acid or thymol with it, and this is an excellent precaution, above all in obstetric practice. At a warm temperature it becomes liquid, and this fact should be borne in mind when rapidly removing it from the vessel, lest it drop on the floor or clothes. There can be no doubt that vaseline will soon entirely supersede the ancient cerates, if it has not already done so in this country. Certainly the necessity of writing a special article on the excellencies of

this substance in gynecology, as was done in France by Sinéty, has not occurred to any of our specialists, who have used it freely since its introduction.

It is abundantly apparent, from the manner in which these ointments are to be used—namely, on cotton or wool tampons—that they are to be introduced through the speculum, whether round, bivalve, or Sims is entirely immaterial. The patient herself may be able to do this without a speculum, if the vaginal orifice is patulous and she sufficiently dexterous. In large gaping vaginæ, as in prolapsus, a tampon covered with lard or vaseline may be rolled in tannin, or alum and sugar, powder and pushed up by the patient herself, to be renewed every day. Very good results have been obtained in prolapsus by this method.

Ointments, if melted, may be injected into the vagina through a syringe, one of hard rubber or glass being best used for the purpose. I have thus found it convenient to inject melted vaseline as an emollient in a case of accidental cauterization of the vagina with chromic acid, and puerperal injury of the canal might afford an indication for the same application. The syringe need not hold more than one ounce and should have a nozzle at least two inches long. Medicated ointments are not used in this manner, since their fluidity will prevent their retention and absorption.

There may be other medicinal substances which have been used as local applications to the cervix and vagina by this or that practitioner in this or that country. It would obviously be next to impossible to collect all the various agents which have thus been employed at different times. Such as have made for themselves a reputation, great or small, I have endeavored to mention, and trust I have omitted none of importance. There is still one agent, largely used internally, per rectum, vaginam, and uterum, and hypodermically, which has also been employed by some as a local application to the cervix. It is ergot, either as fluid extract on cotton (with or without glycerine), or as ointment. Dr. Dabney reports having used with success in cervical hyperplasia the following preparation painted twice daily on the cervix: ℞. Ergotin, gr. xx.; tr. iodii, fl. ʒ j.; glycerinæ, q. s. ad ℥ j. M. Or the following applied on saturated cotton and inserted into the vagina at bedtime: ℞. Ergotin, or Squibb's ext. sq., ʒ ss.; extr. belladonnæ, gr. vi.; aquæ, glycerinæ, āā ℥ iv. M. To be removed next morning.

I have never employed ergot in this manner, believing the absorbent property of the covering of the infravaginal portion of the cervix and the vaginal canal to be too slight to expect great benefit from this drug so applied. Still I have stated, under Narcotics, that such absorption undoubtedly takes place to a certain extent, the more the larger the surface to which the agent is applied; and that this absorption is greatly increased by abrasion of the epithelium. I do not therefore deny that ergot may act beneficially in this manner, although I should expect much more decided effect from it if applied in rectal or uterine suppositories.

δ. *Vaginal Suppositories.*

Any of the solid mineral substances enumerated above can be rubbed up with the excipient ordinarily employed for the purpose, cocoa-butter, and employed in the form of suppositories. These may be made either with the fingers or by being cast into moulds (in which case the medicine is stirred into the melted butter), or much better by pressure in a mould-machine, the melted butter with the medicine rubbed up with it being put dry into the mould. The latter suppositories are much smoother and more compact and regular than those made by the fingers or cast in moulds, and possess the advantage of not having been heated, whereby their medicinal property might have been changed. These facts apply equally to vaginal and rectal suppositories. Vaginal suppositories are, as a rule, made about twice the size of rectal, containing at least one drachm of cocoa-butter to barely one-half drachm for the rectal. They are smoothly pyramidal in shape, the pointed end being first introduced. Rectal suppositories are frequently made conical, like a lead-pencil, and are then introduced with a piston-tube. I have not succeeded in discovering the advantage of this method of inserting them, having found it more difficult to induce patients to introduce the tube than to push the round pyramid of a suppository into the rectum with the finger. By oiling or wetting the suppository its introduction is greatly facilitated.

Suppositories (vaginal and rectal) are also made of gelatine, being cast in moulds of different sizes. This form of suppository was largely introduced by Flockhart & Clarke, druggists, of Edinburgh, who made them at wholesale ; but, on account of the numerous moulds and greater care required, and the absence of any positive advantage over those of cocoa-butter, they have not, to my knowledge, become popular in this country. All the mineral substances used for vaginal applications can be combined in solution with the gelatine suppositories, and also some of the fluid substances used for the same purpose, which, it is true, is an advantage over the butter plugs, with which fluids cannot be combined. Solid gelatine suppositories, however, require to be kept in air-tight bottles, as when dry and hard they do not readily dissolve. Soluble gelatine capsules containing a certain quantity of the agent to be employed have also been manufactured. The best preparations of medicated gelatine which I have met with are made by Robert E. Fleischer, pharmacist, of No. 652 Sixth Street, New York, who has made a specialty of the manufacture of gelatine suppositories and bougies for the vagina, rectum, uterus, urethra, etc., with ingredients and proportions to order. I know by experience that his preparations do not harden when kept. Of the medicinal agents employed locally in various affections of the cervix and vagina, those applied in the form of suppositories are: *Astringents:* Tannin, alum, sulphates of zinc and copper, acetate of lead, nitrate of silver, nitrate of aluminium. *Alteratives:* Iodine, iodide of potash, iodide of lead. *Narcotics:* Extract of opium, belladonna, conium, stramonium, and hyoscyamus, hydrate of

chloral, iodoform, bromides of potash, ammonium, and sodium. *Disinfectants:* Carbolic acid, thymol, boracic acid.

A combination of these agents is often beneficial; thus a disinfectant or narcotic may be added to an astringent or alterative if the discharge be offensive or pain exist, or two astringents (as the sulphates of zinc and copper), or two or more narcotics (as a bromide and chloral, with a narcotic extract) may be combined in the same suppository. It is always a good plan to counteract any pain which may be caused by an alterative or astringent by the addition of a mild narcotic. In cases where the narcotic effect is the one chiefly to be desired, as in vaginismus, a bromide and a narcotic extract (ammonii bromid., gr. x., extr. belladonnæ or stramonii, gr. ij. to v.) act best together; where a disinfectant influence is called for with the narcotic effect, as in carcinoma, the hydrate of chloral alone, or the extract of conium, gr. iij., with thymol, or boracic or carbolic acid, one to two grains to the suppository, make an excellent combination. The general indications, already repeatedly referred to as governing the use of all these drugs in special cases, will influence their selection, dose, combination, and repetition in this form as well.

The quantity of each of the astringent and alterative agents to be used in each vaginal suppository varies from 5 to 10 grains; that of the narcotics from 1 to 3 grains of the extracts; 10 to 30 grains of the hydrate of chloral and bromides, and 5 to 10 grains of the iodoform; that of the disinfectants 1 to 2 grains, each suppository containing at least 1 drachm of cocoa-butter or gelatine, or 2 drachms if the vagina is very capacious.

The suppositories are introduced at night when the patient is in bed, opportunity thus being given for their active agents to be absorbed or exert their local effect before the patient rises and the melted excipient escapes from the vagina. If it is desired to confine the action of the suppositories chiefly to the upper portion of the vagina and the cervix, it is well to introduce a glycerine tampon immediately after the suppository. This is a good plan with the alterative suppositories and those from which a direct anesthetic effect is desired on the cervix. A cleansing or hot injection (according to necessity) is to be used on the next morning. It is always well to avoid possible oozing from the vagina, to direct the patient to wear a genital cloth during the night, after having introduced a suppository.

In virgins in whom the hymen interferes with the introduction of a speculum and the direct application of medicines to the cervix and vagina otherwise than by weak injections, these suppositories form a very convenient means of applying stronger agents when such are indicated. This is frequently the case in chronic leucorrhea and cervical erosion. Their greatest advantage is their introduction by the patients themselves. In this way the certainly more thorough and therefore more effectual application of the agent by the physician, after one of the methods already described, can be limited to intervals of once a week or less, and much trouble and expense be saved the patient. Also, a milder application can

thus be kept up during the interval between the strong measures. I thus frequently give patients with hyperplasia uteri and cellulitic deposits suppositories of iodide of lead or iodoform to introduce every night, while I make the more powerful application of tincture of iodine but once a week, and thus keep up a steady alterative action and get good results. It should be added that the unpleasant odor of the iodoform is best neutralized in suppositories by adding one or two grains of thymol, or, in default of this, five grains of tannin to each suppository.

But a comparatively small number of remedies act better by the vagina than by the rectum, hence the following list is much shorter than generally given. It contains only articles intended to act on the vaginal mucous membrane or cervix, and not on the general system, which is much more easily, thoroughly, and safely reached through the rectum.

Borax	Cicatrizing,	15 grains.
Tannin	Astringent,	10 "
Alum	"	10 "
Acetate of lead	"	10 "
Acetate of lead and opium	"	5 "
Sulphate of zinc	"	10 "
Iodide of lead	Alterative and resolvent,	5 "
Iodide of potassium	" "	10 "
Mercurial ointment	" "	5 "
Iodoform	" "	3 to 10 grains.
Bromide of potassium	Local anesthetic,	30 grains.
Carbolic acid	Disinfectant,	5 "
Borate of soda	Antacid,	20 "

Numerous other agents and combinations prepared by manufacturers are of hypothetical value and partake of the nature of "fancy" preparations.

ϵ. *Insufflation.*

Any powder may be blown into the vagina and against the cervix. But, of course, it is admissible to use only such agents in this manner, the action of which, when left in contact with the mucous membrane for some time, is not injurious. The strong styptic, caustic, and astringent powders, such as the salts of iron, pure alum, sulphates of zinc and copper, should not be used in this way. But tannin, alum and sugar, or alum with starch or powdered slippery-elm bark (equal parts), or iodoform, or tannin and iodoform, or bismuth, will be very beneficial when applied in this manner. The powdered tannin and the diluted salts of alum and zinc, and iodoform, with or without tannin, are most indicated. The chief advantage of insufflation is that the patients can do it themselves by means of a slender metal tube with a tip perforated by many small holes, through which the powder is projected by a rubber bulb at the other end. A homely and inexpensive contrivance of the sort is the ordinary insect-powder bellows. An objection is the ready clogging of the mouth of the tube by the moist powder, which may prevent the spray after the first trial. But this can be avoided by careful cleansing. For

the use of the physician the insufflator possesses no particular advantage, since, if an examination has to be made, the powder can more easily and quite as effectually be applied to the vagina and cervix by being placed in the cylindrical speculum with a spoon or spatula. Through the Sims speculum, however, an insufflator is convenient. And in one respect this instrument is preferable to the spatula in that an excess of the powder is not applied, a matter of importance with some agents, such as iodoform, which irritate locally and produce toxic constitutional effects if too freely used. A protecting cloth should always be worn to prevent the powder dissolved in the vaginal mucus from oozing over the labia, and producing smarting or soiling of the linen.

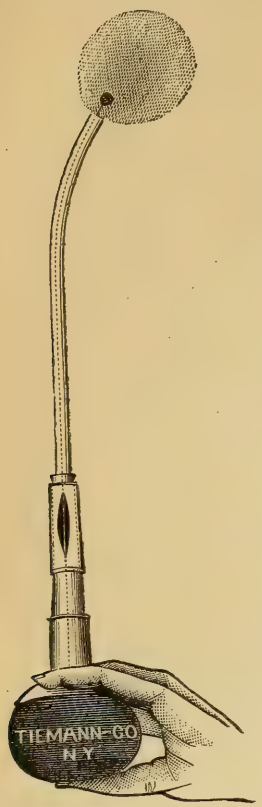


FIG. 90.—Powder Insufflator.

V. TAMPONADE OF THE VAGINA.

The vaginal tampon is employed for various purposes, the chief of which are: 1, as a carrier for the application of medicinal agents to the cervix and vagina; 2, as a means of retaining certain substances introduced into the uterus in their proper position—such as pledgets of cotton, laminaria and sponge-tents, stem-pessaries; 3, as a means of retaining the uterus itself in its normal, or some other position which it is desired to give to it, as in displacements, and as a means of preventing a relapse of a prolapsed ovary; 4, as a mechanical support and stimulus to the pelvic vessels, and an alterative to the pelvic tissues by means of the direct pressure it exerts on them; 5, as a protective to the ulcerated, inflamed or swollen cervix or vaginal walls, to prevent friction and an increase of irritation; 6, as a means of dilating or separating the vaginal walls—a substitute for a hard or distensible dilator—in constriction of the vaginal canal, after operation for vaginal atresia or stenosis, in vaginismus and spasm of the levator ani muscle; 7, as a hemostatic by its mechanical pressure and size (the action of the tampon is really by virtue of its dilatation of the vaginal pouch, and this section might, therefore, properly be combined with Nos. 4 and 5; still, the great importance of this use of the tampon leads me to discuss it separately); 8, as an absorbent of vaginal and uterine discharges, which are thus prevented from touching the external and sound parts, and as a protective to the sound parts from caustic substances applied to the uterus or the cervix. Several tampons may be employed for different purposes at the same time in the same case, as when it is desired to retain the uterus in a certain position while the first tampon is applied over the cer-

vix to keep a laminaria, or stem, or cotton pledget in place; and several objects may be intended by the same tampon at once, when a protecting and dilating influence are desired at the same time, or a hemostatic effect is added to either of these, or an astringent is combined with a supporting effect.

1. *As a carrier for the application of medicinal agents to the cervix and vagina.*

In the preceding pages frequent mention has been made of the introduction of medicinal agents into the vagina and against the cervix, on pledgets of cotton or wool, so-called "tampons." But neither the substance of these tampons nor the details attending their use, and the annoyances and even danger following their abuse, have been discussed. A description, therefore, of the manufacture and employment of medicated tampons in all the minor practical details, is in order. Many of these minutiæ may seem trivial or frivolous; but so little is said about these matters in the ordinary text-books, and even the smallest details may prove valuable and save annoyance, that I feel sure the beginner will appreciate the object intended in these pages. The material preferred for the manufacture of tampons is generally cotton, as it comes in rolls or sheets, preferably the former. It is not necessary to use the purified, so-called "absorbent" cotton for tampons, unless a special degree of absorption of the fluid or an esthetic effect is desired; the absorbent cotton is used mainly as a vehicle for intra-uterine applications. Some gynecologists prefer tow, plain or carbolized, and Dr. Skene, of Brooklyn, is very enthusiastic in his advocacy of a refined preparation of that article known as "marine lint" for tampons. The disinfectant property of the tow is no doubt an advantage, but its brown color has always made it objectionable to me, both as a substance for tampons and for vulvar pads in the lying-in chamber; this color prevents the appearance and character, and the tar-smell the odor, of the discharges from being clearly ascertained, and thus removes a valuable diagnostic auxiliary. It is for this reason, also, that I prefer the plain white cotton as a mop in the dressing-forceps to sponges on holders or to tow in the ordinary cleansing manipulations of the cervix during a specular examination.

Accordingly as it is desired to keep the medicinal agent in contact with the cervix alone, or to place it against the vaginal walls, the tampon is differently shaped and constructed. When a tampon is to be merely soaked in glycerine, or some glycerole (as of tannin or iodoform), or a dry powder is to be placed against the cervix, the tampon is made as shown in Fig. 91, the cotton being flattened into a disk about two inches in diameter and one-sixth of an inch thick, with a string loosely tied about its middle so as to constrict it but slightly. But, if a patient wearing one of these disk tampons is to move about, it will generally be advisable to support this tampon by another of a cylindrical shape, especially if the disk be soaked in a fluid liable to escape from the vagina and stain the linen. The cylindrical tampon is made by rolling a handful of cotton-wool tightly together to the required size and shape, and tying a stout twine firmly around its

middle. It is always convenient and time-saving to prepare these tampons in bulk and keep a supply on hand. A number of cylindrical tampons are rapidly made by spreading out the whole roll of cotton (which often comes in loosely compressed sheets, but unglazed, remember; the glazed cotton does not absorb well), and then rolling it up again tightly, as one rolls a roller-bandage, until the desired thickness is reached. This rope of cotton, which is about two feet long, is then detached from the remainder of the bundle, and twine is tied tightly around it at intervals of two inches, beginning and ending about one inch from either end. The roll is then cut through between the twines, and a certain number of cylindrical tampons two inches in length by one inch thick are obtained (Fig. 92). This is about the size of the ordinary tampon as applicable to vaginæ of normal width; in abnormally distended vaginæ, or where it is intended to distend the canal (as in hemorrhage) the size of the tampon should be proportionately increased. If the vaginal pouch is to be tamponed, the tampon should be round like a ball, of the size of an English walnut, and not

Fig. 91.—Flat Disk Tampon.

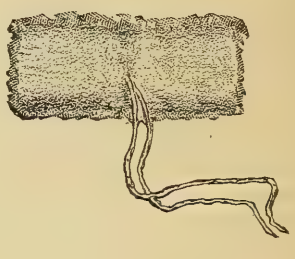


Fig. 92.—Solid Cylindrical Tampon.

too tightly wrapped, so that it may adapt itself to the shape of the pouch. But a cylindrical tampon may also be used for this purpose, being laid crosswise into the pouch. It is not superfluous to mention that the twine should be sufficiently strong, so as not to break when the patient attempts to remove the tampon, and long, so that it does not slip within the vagina and thus evade the patient's fingers. It is very disagreeable to be called to remove a tampon the cord of which has broken or cannot be reached, particularly if that tampon has become offensive, as it generally does within forty-eight hours. And the removal of such a tampon is by no means an easy task, being perhaps impossible by the fingers alone if it carried an astringent. Even with the long dressing-forceps it is an unpleasant and tedious matter to grasp the compressed and slippery cotton without inadvertently seizing the vaginal wall in the forceps. I have found that by introducing two fingers and hooking them above the tampon, its removal is much facilitated in a roomy vagina. But where the vagina is narrow or the tampon large, it will be found much the best plan to put the patient on the side, introduce a Sims speculum, or use the first

two fingers of the left hand as a substitute and expose the tampon, before attempting to remove it with the forceps.

The twine depending from the tampon should be about eight inches long, so as to protrude some two or three inches from the vagina. Strong white twine is the variety generally employed.

One rule it is very important to bear in mind in connection with the use of tampons, viz. : never to omit to tell a patient that she has such an article in her vagina, and that she is to remove it by the string within a given time. My nurse has strict orders always to remind patients again before they leave, of the presence of the tampon, and that it must be removed within twenty-four hours. It is also well to impress upon them not to use too much or sudden force in traction on the cord, for fear of breaking it, and that traction should be made downward toward the perineum, the fingers grasping the cord as close to the vulva as possible. Tampons should generally be removed after twenty-four hours. If allowed to remain longer, they are very liable to become offensive, even when carbolized. This is especially the case when a number of tampons have been introduced for uterine hemorrhage and left untouched for forty-eight hours, as is frequently necessary in dispensary practice ; the blood gradually saturates the cotton, decomposes, and the tampons, in spite of carbolization, are exceedingly offensive when removed. When circumstances permit, in such cases, it is advisable to renew the tampons every day, even at the risk of re-exciting the hemorrhage. It is not practicable to carbolize the tampons so strongly as to effectually prevent decomposition, since the acid, together with the pressure, would excoriate the vagina. In this respect the other disinfectants, chiefly solution of thymol, are preferable, since they can be used in a more concentrated solution without cauterizing. In removing tampons, when a number have been introduced, care should be taken not to overlook one ; I have seen a chill and rise of temperature simulating septicemia follow the accidental retention of a small tampon soaked in a dilute solution of the chloride of iron, in a case of amputation of the cervix, symptoms which at once subsided when the tampon was detected and removed and the vagina washed out. It is therefore advisable to remove a batch of tampons, even when supplied with traction-cords, with forceps through a Sims speculum, rather than trust to withdrawing them by the cords, and to make note of the number of pledgets introduced. I shall explain farther on why, as a rule, a column of tampons should be introduced and removed only through the Sims by the physician, and cords are therefore not required.

I have already mentioned that other substances than cotton, such as oakum, or marine lint, or wool, may be used for tampons. Where a mere disinfectant effect is desired, the tow, especially if carbolized, is superior to cotton ; where an expansive elasticity is called for, as in fixing the uterus or dilating the vagina, the wool excels either cotton or tow. Practically, cotton answers every purpose if properly prepared, and being most easily procurable, is undoubtedly most popular. Sponges are also used as tampons, as well as English lint-sheeting rolled into the required shape

and size. Sponges answer very well when the patient herself is to introduce the tampon soaked in pure glycerine or some astringent or disinfectant solution in glycerine, or covered with some ointment. But, as a rule, it is best to throw away the tampon and replace it by a fresh one every day, for it is liable to become foul, no matter how carefully it is cleansed; and this would obviously be rather expensive with sponges. The same objection applies to English lint, which absorbs fluids very rapidly and thoroughly, and forms an excellent tampon. A very plausible substitute for these substances is recommended by Dr. Frank P. Foster, of New York, in the shape of ordinary lampwicking, which is cheap, abundantly absorbent, and resilient. Dr. Foster introduces the wicking through a speculum, packing in with the forceps strip after strip of the unwound wicking (it comes wound in balls) until the vagina is filled. The wicking is then cut off some two or three inches from the vulva, the tampon supported by finger or forceps, and the speculum withdrawn. The great advantage of this wicking-tampon, according to Dr. Foster, is that the patient, by pulling on the piece projecting from the vulva, can remove the whole mass by simply unwinding it inch by inch; therefore, neither in introduction nor removal has a large mass to pass and distend the vaginal orifice. I have not had occasion to employ this tampon, but, judging from the description, am very favorably impressed by it, especially in cases where it is necessary to introduce a number of tampons the removal of which the patient herself is to accomplish. This is frequently the case with patients living at a distance, in whom the supporting, dilating, or hemostatic tamponade is required. I have already referred to the difficulty of removing such a multiple tampon, except with the forceps through a speculum. If a number of separate tampons are introduced, each with its string attached, and the patient is told to remove them herself, the multiplicity of cords renders it impossible for her to know which tampon to remove first, and she may quite as well attempt to withdraw the uppermost one first as the lowest, and, if she does this, will either fail entirely or drag the whole mass through a vaginal orifice perhaps large enough only to admit one tampon at a time. This occurrence may be avoided by attaching strings of different color or length to the several tampons, the patient making note of the order in which to pull on these strings, or making knots to each string—one knot for the first tampon to be removed, two for the second, and so on. I have endeavored to overcome this difficulty (which, however, really comes into play only when the vaginal orifice is narrow, for a gaping vulva offers no obstacle to the removal of even a large mass of tampons) by introducing first a large flat tampon with a stout cord, which filled the whole vaginal pouch, and then placing smaller flat tampons without cords against this, so that traction on the one string would remove all the tampons together. It must, however, be remembered that occasonally a tampon may be left behind in this manner, an occurrence to be detected by remembering the number of pledgets introduced and counting them on their removal. As a rule, whenever it is necessary to introduce a number of tampons at the same time (which is chiefly the case in hemorrhage and uterine displacement)

it is worth the while of both patient and physician to introduce and remove them *properly*, that is, with forceps through the Sims speculum, and cords therefore are not required.

The old-fashioned kite-tail tampon, where a number of pledgets are tied one after the other on one string, by which they are removed, is certainly useful when nothing better presents.

The lamp-wick tampon of Dr. Foster is merely an improvement (chiefly through the porosity and firmness of the wicking) on the old tampon of long strips of linen or calico, which, after being boiled, were soaked in the fluid to be used for the occasion and packed into the vagina; they were withdrawn by the piece allowed to protrude, precisely like the wicking. A tampon which was highly lauded and really is excellent in cases of hemorrhage, chiefly during miscarriage, is the ordinary roller-bandage, which is introduced either through or without a speculum, the central portion being pushed upward by the finger as soon as the roller touches the cervix, and plugging that canal. In this way not only the vagina, but also the cervix, are tamponed. It is removed by the tail of the bandage, which is left hanging from the vagina. This bandage may be medicated, but its use is chiefly adapted to cases of hemorrhage. Ordinary picked linen lint, such as is used largely in surgical practice, is no longer employed for vaginal tampons. It is too coarse, stringy, and not sufficiently cohesive. For hemorrhage, dilatable rubber-bags (so-called colpeurynters), or, for want of anything better, an ox or pig's bladder, form excellent tampons. For purposes of medication they are useless.

I have already stated that ordinary loosely picked cotton-wool, as it comes in rollers two feet long by six inches wide, is that commonly used and perfectly satisfactorily for tampons. The refined, bleached cotton-wool, from which all fatty matters have been extracted, is a decidedly more elegant, but also more expensive article, which possesses only the other advantage of absorbing fluids more readily, whence its trade-name "absorbent cotton." It is used in ordinary practice, chiefly for intra-uterine applications, being wrapped on a stick or applicator. I always employ it to tampon the cervix or uterine cavity, and occasionally as a vaginal tampon when I wish thorough saturation of the cotton by the medicated fluid, as in the application of strong caustic solutions (chloride of zinc) to the cervix and vagina in carcinoma, or when the absorption of discharges is intended. I therefore always keep both the ordinary and the absorbent cotton in my drawer, ready for instant use. For the removal of fluids and secretions from the cervix with the cotton-wrapped stick or forceps, the absorbent cotton excels the ordinary variety.

The manner of using medicinal agents in powder, solution, or ointment on tampons, has already been described in the preceding chapter. I need merely repeat here that the powders are sprinkled on the dry tampon, or better, the tampon soaked in water or glycerine, or covered with vaseline, is rolled in the powder; that solutions are applied by saturating tampons in them and expressing the latter more or less before introduction, or the medicated tampons may be allowed to dry and be used in that state (par-

ticularly advisable for disinfectant—carbolic, thymol; styptic—solution of persulphate of iron; and alterative—iodine, remedies); and lastly, that medicated ointments are smeared over the cotton and left *in situ* until absorption has taken place. The mere emollient effect of vaseline is probably made use of more frequently in this manner than that of medicated ointments.

It is always advisable to keep on hand a supply of absorbent cotton which has been soaked in one of the following solutions and allowed to dry: Liq. ferri subsulph., 1 part to 3 of water; alum, 1 part in 12 of hot water; tincture of iodine, pure; iodized phenol, pure; carbolic acid or thymol, 1 part to 30 or 50 of water. This dried medicated cotton can be used in the quantity desired after any length of time; the iron and alum as styptics, chiefly for packing the cervical and uterine canal after discission and removal of fibroids, and in cancer of the cervix; the iodine as a disinfectant after operations on the uterine cavity, and as an alterative; the iodized phenol as a caustic in endotrachelitis and cervical erosion or cancer; the disinfectants as supporters of the above tampons, and in offensive discharges. Care should be taken to keep the iodized cotton in a well-stoppered bottle in a dark place.

The great advantage of using dried ferrated cotton in place of the freshly soaked article, as a permanent application to the cervix (as in bleeding cancer), will have been appreciated by all who have seen the liquid iron escape from the cotton and run down the vagina, in spite of all caution and previous squeezing, when the tampon is packed tight. Besides, the operator's hands are in no manner improved by squeezing out the iron-soaked cotton, an objection by no means to be overlooked by the gynecologist, who should keep his fingers not only clean, but sensitive. An unpleasant feature of all medicated cotton, chiefly the ferrated, is that the fibre of the material becomes softened and more or less destroyed by being soaked and boiled in the medicated solution, and that tampons made of such cotton are much less cohesive and, therefore, less serviceable than when made of raw or absorbent cotton. This is especially noticeable when it is desired to thrust ferrated cotton rapidly into the vagina as a tampon for hemorrhage, and the forceps-points slip through the loose fibres as through tissue-paper. Powders may also be applied to the vagina by being enclosed in small bags of fine muslin, so-called sachets, which are tied at the mouth with a string long enough to escape from the vagina, and, being smeared with glycerine or vaseline, are introduced by the woman herself; or a piece of sheet-batting may be used, the glazed surface having been removed. The bag soon becomes soaked in the vaginal discharge, which mingles with the powder, and the solution thus formed oozes through the envelope. Tannin, alum and sugar (alum alone is too strong to be applied to the vagina at any time), zinc, acetate of lead, may be applied in this way, which certainly is a better method than any other of introducing astringents into the vagina when the physician is not at hand to do it.

A favorite remedy with some practitioners is the introduction of emol-

lients in this manner; thus, ground flaxseed, slippery-elm bark, poppy-heads, or all combined, are enclosed in a fine muslin bag of the size of a small lemon, soaked in hot water, and then pushed by the patient herself up to the cervix. This is best done on retiring at night, and the poultice is removed the next morning, to be followed by a hot injection. In pelvic cellulitis, chronic ovaritis, hyperplasia uteri, these internal poultices certainly act beneficially as local sedatives and alteratives.

A precaution of the greatest importance in applying pledgets of cotton soaked in strong caustic or diffusible substances to the cervix or vagina, is to thoroughly remove all excess of the agent by careful mopping, and then to apply tampons soaked in an alkaline fluid to neutralize any possible later oozing from the caustic cotton. It is almost incredible how, even after the most careful expression and mopping, more or less of the caustic fluid will ooze along the side of the protecting cotton after the patient has been put to bed, and the operator will find the evidence of it on removing the tampons next day. By neutralizing this possible flow, as above indicated, a perhaps very annoying slough will be prevented. The chloride of zinc is the agent particularly in my mind while advising this precaution, and the bicarbonate of soda in saturated solution is the

Fig. 93.—Uterine Dressing-forceps. A catch near the handle increases the utility of the forceps.

best antidote. Nitric acid, chromic acid, bromine, can also be neutralized by this same agent. For nitric acid, I generally use oil or vaseline on the tampons.

I have already spoken in the preceding chapter of the *manner of introducing tampons into the vagina.* I there referred only to tampons soaked in glycerine, the necessity for the daily systematic use of which renders it desirable that some means should be devised which will enable the patient to introduce them efficiently herself. Ordinarily, medicated tampons require to be placed by the physician himself, through one of the various kinds of speculum, because the size of the tampon or the nature or strength of the substance with which it is covered or impregnated prevent the patient from passing it through the vaginal orifice by the fingers only. Small pledgets soaked in glycerine are usually slipped into the vagina without difficulty if the patient possesses an ordinary amount of dexterity or boldness, but larger tampons are introducible by the fingers only when the vaginal orifice is exceedingly patulous, as with lacerated perineum and in procidentia vaginæ or uteri. I shall refer to these cases hereafter.

To enable patients, therefore, to introduce glycerated or otherwise medicated tampons themselves, tubes with piston-rods have been devised by Thomas, Barnes, and others, into which the tampon is placed, and, the tube having been introduced into the vagina, pushed out with the piston.

If the cotton pledget is very small, not larger than an English walnut, these porte-tampons will answer very well, although the majority of unmarried women find more or less difficulty (arising from awkwardness or timidity, as much as from narrowness of the hymeneal opening) in inserting the tube. But when it is desired to apply larger tampons as supporters of the uterus, dilators of the vagina or carriers of a larger amount of medicinal substance, these slender tampon-tubes will be found insufficient, and the aid of the physician will be needed to apply the tampon. The same holds good when the tampon is to be placed in a certain portion of the vagina, as before or behind the uterus in the respective displacements, a maneuvre which can be properly carried out only through the Sims speculum. The extent of the usefulness of porte-tampons is, therefore, the introduction of small, soft pledgets soaked in glycerine, glycerole of tannin, or some similar solution, or covered with vaseline, medicated or not. The small size of these tampons and their limited capacity render their benefit, with the exception of the glycerated, comparatively slight.

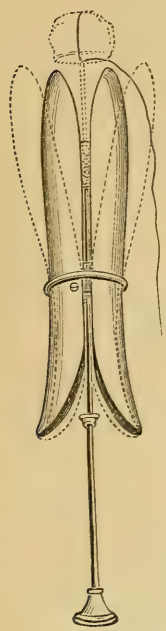


Fig. 94.—Barnes' Glove-stretcher Tampon Tube.

Of the various tubes, the hollow glove-stretcher of Barnes (Fig. 94) appears to me the most useful, as it is more easily introduced and admits a larger tampon than the others.

In chronic leucorrhea, areolar hyperplasia, and chronic cellulitis, the daily introduction through a tube of even these small tampons soaked respectively in some astringent glycerole, pure glycerine or iodized glycerine, will, for the want of a more thorough application, eventually result in benefit.

The insertion of a tampon of ordinary size through a tubular or bivalve speculum is performed in the following manner : the tampon, having been soaked in the fluid and expressed so as not to drip, or covered with the ointment, or rolled in the powder, is seized with the uterine dressing-forceps and introduced lengthwise into the speculum, care being taken in doing so not to rub off the powder or ointment with which it may be covered, or to cause the fluid with which it is impregnated to ooze over the edge of the speculum and drop on the clothes. The tampon is then pushed gently forward with the forceps, the blades of which still enclose it, until it reaches the cervix (which, of course, must have been exposed before). The cord of the tampon has been allowed to hang out of the speculum. The forceps now release the tampon, and the point of the closed blades crowds the cotton well up against the cervix, if that be the purpose ; if, however, the tampon is to remain lengthwise in the vagina, as when it is used to separate the walls or bring all of its surface in contact with them, this packing is omitted, and the tampon merely held firmly with the point of the closed forceps, while the left hand, which all this time has been supporting the speculum, withdraws

that instrument. The tampon must be pushed up with sufficient firmness to prevent its being dislodged or removed when the speculum is withdrawn ; but care should be taken not to allow the forceps-point to slip beside the cotton when this pressure is made, and injure the vaginal vault, as I have seen happen several times. This could, of course, be always avoided by pressing the tampon up between the forceps-blades, instead of with the closed blades ; but I have advised the latter because I have experienced difficulty in removing the open blades from each side of the tampon when it has been tightly packed and the speculum has been removed. The best way, perhaps, is to open the blades slightly, and push with both blades separated about half an inch, when they will not be likely to slip. Any stick, like a stout whalebone applicator or a penholder, may be used to push up, pack, and hold the tampon. But I have advised the long dressing-forceps because they are (or should be) always at hand, because the tampon is seized with them, and they answer every purpose. They are an invaluable instrument in uterine practice. I always employ them as the carrier of cotton with which I wipe off the cervix or remove an excess of some fluid application, and find them far more convenient than sponge-holders or cotton-wrapped whalebone sticks for this purpose. The latter have to be wrapped afresh for each mopping, while with the forceps a bit of cotton is simply torn from the roll, and thrown into the slop-jar when soiled. For applications of fluid agents to the cervix and vagina, however, the cotton-wrapped applicator is more convenient.

In introducing a medicated tampon through a Sims speculum, care should be observed, when passing it into the vagina with the forceps, not to touch the edge of the orifice and strip off the agent, which, if fluid, will flow over the lower natis on the patient's clothes, and in any case may cause smarting of the sensitive vulva. When the tampon has been passed up into the vaginal pouch and properly adjusted it is held between the blades of the forceps (which in this position and with Sims' speculum can easily be removed) and the speculum withdrawn with the tip of its vaginal blade pointing backward until it emerges from the vagina. If care is not taken to keep the blade directed well backward in withdrawing it, but the point is allowed to leave the posterior wall during this maneuvre, the tampon may very readily be caught in the groove of the blade and dislodged from the fornix, or entirely removed—scooped, as it were, out of the vagina. When the speculum has been withdrawn, the dressing-forceps are also removed; indeed, their pressure against the tampon may be relaxed as soon as the point of the speculum has passed that object.

After removing the speculum, the external parts should be cleansed of any secretions or fluids which may have escaped from the vagina or tampon, and the cord so adjusted that the patient can easily find it when she wishes to remove the tampon. If there should be any oozing of medicated fluid from the vagina, or any danger of this occurring, it is well to tuck a piece of cotton loosely into the vulvar cleft, pressing it lengthwise between the labia, so as to give it a certain amount of ad-

herence. The patient should be told to remove this when she wishes to empty her bladder.

I have already stated that tampons, even when disinfected, should rarely be allowed to remain longer than twenty-four hours. It is customary to tell patients to remove a tampon which has been introduced about noon of one day on the morning of the next—that is, after about eighteen hours. All the benefit to be derived from that tampon and its ingredients has been obtained by that time. An exception is made only when a very large astringent tampon has been introduced as a substitute for a pessary in vagino-uterine prolapse, and it is to be replaced at once by a fresh tampon, which it is not convenient to do oftener than every other day, and in some cases of hemorrhage, when a too early removal might again start the bleeding. These exceptions will be referred to hereafter.

The manner of removing the tampon by the attached cord has also been described, and the precautions to be used. Ordinary medicated tampons, whether introduced by the physician through a speculum or by the patient, are generally supplied with a cord for removal by the patient; only such tampons as are designed for purposes of support or hemostasis, being applied in a particular manner and perhaps intended to be replaced at once by a fresh one, are not furnished with a string, and are removed by the physician with speculum and forceps.

Should an accident occur and the cord break during the attempted removal of the tampon, it is best to introduce a Sims speculum at once and remove the cotton with forceps; or, as already stated, in the absence of such a speculum, the two fingers of the left hand or the handle of a large spoon properly bent, may take its place as a perineal retractor and expose the vagina sufficiently to enable the forceps or fingers of the other hand to seize and remove the cotton. A tampon may be removed also through a bivalve expanded to its greatest width, but this is difficult through a tubular speculum, the point of which pushes the tampon aside or crowds it into the cul-de-sac.

A cleansing injection of tepid or hot water, with or without subsequent disinfectant or astringent addition, should be taken immediately after the removal of a tampon, unless counterindications to injections exist, such as tendency to hemorrhage. Patients should be told that after the removal of an astringent tampon they may experience some difficulty in introducing the nozzle of the syringe to the usual depth, owing to the temporary contraction of the canal, and that they need not be alarmed at this. They should also be cautioned, if there is an erosion or easily bleeding surface of any kind on the cervix, against introducing the nozzle of the syringe to its full length, for fear of striking against the eroded spot and producing fresh hemorrhage.

2. *As a Means of Retaining Certain Substances Introduced into the Uterus in their Proper Position.*—If a conical tent of cotton has been introduced into the cervical canal as a hemostatic after discission, or a sponge, laminaria, or tupelo tent has been applied, or a stem-pessary has been inserted into the uterus, some support may be required to prevent these

various bodies from becoming displaced and slipping out of the uterus. Such support is not always needed, for the cotton tent may be so tightly packed as not to slip, or the dilating tents may dilate so rapidly (chiefly the sponge) as to retain themselves; or the stem-pessary may be kept in place by its bulb pressing against the vaginal wall, as is always the case in ante-displacement of the uterus. But as regards the cotton and the tents it is always safer to make sure of their being retained by placing flat pledgets of cotton over the cervix, and then supporting this flat tampon by a cylindrical one. These tampons can be applied through a large cylindrical or bivalve speculum, which properly exposes the cervix; but, as the object they are to support will most probably have been introduced through a Sims (at least it is most easily so introduced) the tampons will naturally be applied at once through that speculum. Neither tampon need have a cord attached, since in the case of the cotton tent the operator would, after a discission of the cervix, naturally remove the pledget himself through a speculum within twenty-four hours, and replace it by fresh wadding, and the dilating tent should also always be removed by the physician through a speculum. In some cases, however, where I introduce a medicated cotton tent into the uterus (as hereafter to be described), I place a cylindrical tampon against the cervix and direct the patient to remove it next day and use her hot injection, the uterine tent coming away spontaneously in several days. Or I attach a thread to the uterine tent and tell the patient to remove it the next day with the vaginal tampon. The tampons should be soaked in a disinfectant glycerine solution, and are introduced and removed precisely as already described, care being merely taken to have the disk tampon over the cervix large enough to insure its retaining its place over the external os.

If it is found that a stem-pessary is not retained, and a solid support by means of an attached vaginal pessary is not borne, or is counter-indicated, the daily application of a cotton tampon over the cervix, as just described, will answer the purpose. Since the stem would slip out if the tampon were removed without at once introducing another, it is obvious that only the physician himself should introduce and remove these tampons, therefore no cords are needed. The application of a cylindrical or round tampon in the anterior vaginal pouch may serve to retain the stem by pushing the cervix against the posterior wall.

3. *As a Means of Retaining the Uterus in its Normal or some other Position, and of Supporting a Replaced Prolapsed Ovary.*—There are numerous instances in which it is desirable to steady and support the normally situated healthy uterus immovably in its position, and where a hard pessary is not borne. As examples of such cases may be cited inflammatory and spasmodic conditions of the bladder or rectum, acute ovaritis, in which affections the constantly varying pressure of a normally movable uterus on the inflamed organs will cause pain; or, in displacements of the uterus, ante, retro, or downward, a hyperemic and tender uterine body, or edematous or inflamed parametrium will not tolerate the steady pressure of a hard supporter. Or an inflamed and exquisitely tender prolapsed

ovary forbids the use of such a pessary, and still a support of that ovary is called for. In such cases the substitution of the permanent support by the daily introduction of glycerated cotton tampons will, in many cases, gradually accustom the parts to the pressure, make room for a permanent pessary, and relieve both inflammation and displacement.

Such a tampon, or such tampons, to be efficient must be placed and retained precisely where the pressure is most needed. It is, therefore, indispensable that they be introduced through the Sims speculum, which exposes the whole vaginal vault and permits free motion of the uterus. The method may be described in a few words. The uterus or ovary having been manually replaced, if a displacement existed, the cervix is exposed by the Sims and seized by its anterior lip with a tenaculum and drawn gently in the direction opposite to the spot where the first tampon is to be applied. The posterior cul-de-sac being the deepest, is generally first filled; the cervix is, therefore, drawn anteriorly, and a round, not too hard, cotton tampon soaked in glycerine is seized with the dressing-forceps and placed behind the cervix, where it is gently packed tight with the forceps. The tenaculum then being removed, a similar tampon is placed in front of the cervix and also packed as tight as the much more shallow anterior pouch permits. A tolerably large flat disk tampon is then placed directly over the cervix and the first two tampons, and this disk again supported by another flat, or a cylindrical tampon placed lengthwise parallel with the long axis of the vagina. It may not be absolutely necessary to apply this last tampon if the patient is to remain in the recumbent position while retaining the tampons, but if she is allowed to walk about, the upper pledgets will surely be displaced unless supported by the cylinder. If the vaginal pouch is very large and wide, or if it is desired to make transverse as well as posterior and upward pressure (as in ovarian prolapse) a cylindrical tampon applied transversely may be preferable to the ball. If entire immobility of the uterus is desired, a cylindrical tampon, applied transversely in each of the four sections (posterior, anterior, and two lateral) of the vaginal pouch, and secured by a fairly large disk and a longitudinal cylinder, will attain the object. These tampons must be renewed every day; and it is a good plan to have the patient remove them by the attached cords (which may be marked or of different lengths, as described above, although, as a rule, little difficulty will be experienced in removing the whole mass at once in these cases), and take a hot vaginal bath, before the physician comes to reapply them. If the patient goes to the physician's office it is certainly better that she should retain the tampons until they can be at once replaced by fresh ones, and cords are then not required. A daily hot injection, however, materially aids the treatment in these affections.

These tampons are most useful in retrodisplacement of the uterus, with or without ovarian prolapse, in which cases the uterine body or retrouterine cellular tissue is frequently too tender at the outset of the treatment to tolerate a hard supporter. If continued with sufficient perseverance, the displacement may even be cured by these soft tampons, and

a subsequent hard pessary rendered unnecessary. When the retrodisplaced fundus uteri is adherent, these daily emollient and hydragogue tampons may in time, by their combined pressure and alterative action, bring about the absorption, or at least stretching, of the adhesions, and permit a replacement of the organ. If there is congestion of a prolapsed ovary, or the retro-uterine parts are very relaxed and tender, the substitution of a watery solution of tannin (1 : 4) for the glycerine in the tampon is recommended by Dr. Fordyce Barker.

Fig. 95.—Uterus Supported by Tampons, either as Applied after Replacement of a Retroverted Uterus, or a Prolapsed Ovary, or for Anteversion and Sagging (P. F. M.).

The painting of the vaginal mucous surface over the inflamed parts with tincture of iodine before applying the supporting tampons is a good plan, but it must not be done oftener than once a week, and only the simple tincture be used, or the iodine and pressure combined will exfoliate the epidermis.

Besides in retrodisplacements, I have found these daily tampons of great benefit in another variety of uterine deviation, where a heavy subinvoluted uterus anteverts and sinks down in the pelvis so that its hard cervix rests on the posterior vaginal wall, into which, as the patients express it, it seems to bore. The patients complain of a steady, gnawing, burning pain in the lower portion of the sacrum, which is at once relieved by lifting the cervix away from the posterior vaginal wall and supporting it. In old cases of this displacement hard pessaries are often not borne at first, and the daily glycerated cotton tampon answers admirably. I have entirely cured a lady of both her displacement and hyperplasia, as well as of a chronic ovaritis of the left side (for which, it is true, constant abdominal counter-irritation was also employed), by packing the posterior cul-de-sac with glycerated cotton every day before she left her bed, for a period of three months. She could wear no pessary, and could scarcely walk without the cotton support; with it she was perfectly comfortable. She is now, four years later, a perfectly well woman.

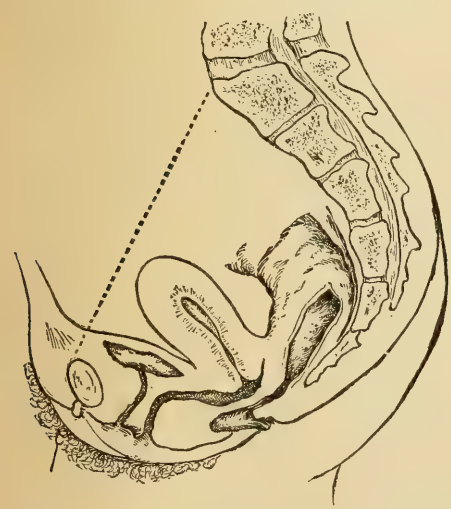


Fig. 96.—Downward Sagging of Anteverted Uterus (P. F. M.). Compare with Fig. 16, representing simple Anteversion.

Such tampons are easily applied by the physician alone, in the absence of a nurse, by inserting the Sims speculum in the knee-breast position. The left hand holds the speculum and retracts the perineum, thus admit-

ting air, and dilating and fully exposing the vaginal canal with the cervix; the right hand places the cotton with the dressing-forceps where it is wanted, and the patient lies on her left side for a few moments before rising in order to permit the air to escape and the vagina to contract about and fix the tampons. I have taught private nurses to apply the cotton in this way, and have thus saved patients living out of town the trouble of coming to me and the expense of having me go to them. One precaution is to be mentioned in applying tampons in this manner, viz., that the complete distention of the vagina by air requires rather larger and more tampons in order to insure their proper retention than is necessary in the lateral decubitus.

I have thus far spoken of tampons only for the retention of ante- and retrodisplaced uteri. In lateral displacements the tampons are placed on either side of the cervix, the one to crowd the cervix away from the side toward which it is directed and bring it in the median line, the other to push up the fundus. The usual disk and cylinder are required. The utility of these lateral tampons is not as great as that of the posterior, owing to the shallowness of the lateral vaginal pouches. Still, in view of the difficulty of procuring efficient and supportable hard pessaries for these laterodisplacements (which, unless congenital, are usually due to traction by cellulitic or peritonitic adhesions) the cotton supports may be found serviceable in the comparatively rare cases of positive disturbance by this displacement.

It now remains for me to speak of the use of cotton tampons as veritable supports, as a substitute for pessaries and vagino-abdominal supporters, in cases of partial and complete prolapsus uteri et vaginæ. While in the ante-, retro-, and lateral displacements the tampons are small and correct the displacement more on the principle of the lever pessary, in prolapses of the vagina and uterus they act entirely by their size and have a mere retaining power. The bulk of the tampon, in fact, secures its retention; a small tampon would be of no use whatever, as it would be forced out on the first expulsive motion. These large tampons need therefore only to be pushed into the vagina as far up as they can be crowded, and usually require to be guarded against expulsion by intra-abdominal pressure by a broad T-bandage. The tampon in these relaxed conditions of the vagina and uterine supports merely takes the place of a pessary, the majority of which instruments are either too small or too weak to retain the uterus during the forcible expulsive efforts made in walking, lifting (which the women suffering from these affections are generally obliged by poverty to do), and defecation; or too large, and give pain or cause excoriation and ulceration of the vagina. But these cotton pessaries possess two great advantages for the treatment of prolapsus vaginæ et uteri over permanent mechanical supporters, and these are: 1, their cheapness, and 2, the possibility of impregnating them with astringent substances which contract the vaginal walls and ultimately (except in senile atrophy), restore their tonicity to a greater or lesser extent, and fit them for a permanent supporter. Such an astringent is pre-eminently the finely powdered tan-

nin, so frequently spoken of in these pages. Such tampons may have to be renewed daily for months, at least; but they will not fail to secure decided improvement in moderately new, and certainly temporary relief (so long as used) in old cases. I have met with many cases of total procidentia in which none of the complicated and expensive contrivances supplied by the instrument-makers retained the organ properly, or at least painlessly and without injury, but I have still to see the case in which the large tannated cotton tampon supported by a T-bandage failed to achieve this result without injury or pain. An objection to it certainly is that, to be properly applied and to do the most good, it must be introduced through a speculum and tightly packed by a physician. But this objection will really hold good only in localities where the patient has no dispensaries to visit every day or two; in cities, no poor patient has this excuse, certainly not in this country; and the wealthy can secure the physician's attendance as often as they are ready to remunerate him. And, even for the poor who have no charitable institutions at their command, as in country districts, this method is available, because they can, after a fashion, apply the tampons themselves, as I shall presently show.

I have already stated that the large tampon is best inserted, in these cases, through a speculum, which may be the largest size of cylindrical or a bi- or trivalve, but is always preferably the Sims. If a tubular or plurivalve speculum is used, the tampon must be crowded in sidewise, so as not to become blocked at the mouth; if the Sims is employed, the largest-sized tampon may be easily laid exactly where it is wanted.

These medicated astringent tampons are especially useful and curative in subinvolution and prolapse of the anterior or posterior vaginal wall, so-called cystocele or rectocele, in which the astringent is vastly more effectual in restoring the natural tonicity of the parts than in old prolapsus uteri. Pessaries, even the latest and most efficient, that of Gehrung, do not act as curative means; they are merely retentive agents. That portion of the tampon which is to be placed in contact with the subinvoluted or prolapsed part is most heavily saturated with the astringent, which may even be powdered on that spot, and the tampon is, therefore, best placed through the Sims, whereby most perfect adaptation is secured and none of the ingredients are expressed or wiped off. I have had such good success with these tampons, in rectocele particularly, as to look upon them as curative when the prolapse is complicated with fresh subinvolution of the vaginal wall. In one case of aggravated rectocele, within six months after confinement, I relieved the urgent distress by tannated tampons daily applied, telling the lady that it would be necessary for her complete cure to operate on and sew up the perineum, which was lacerated to the sphincter during her first labor fifteen years before. As the hot weather was approaching I decided to defer the operation till the fall, and instructed her in the use of the tampons while she was away in the country. When I saw her again in the autumn, to my surprise the rectocele had entirely disappeared, and to this day, eight years later, has not reappeared. The tannin tampons thus deprived me of a very lucrative and

probably creditable operation. So favorable a result will rarely, however, be met with in cases where the confinement is more remote, and complete involution of the vaginal walls has taken place.

I have spoken of the necessity for the physician's introducing these tampons as an objection. There can be no question that they do vastly more good if properly packed tight by the physician; but in inveterate cases of total procidentia even the incomplete painless retention of the prolapsed mass is regarded as a boon, and the means by which this can be attained are joyfully hailed by the patient. I have had a large experience with this remedy among the poor classes, and have always found that the patient herself, if she be possessed of the ordinary amount of intelligence, can readily be taught to introduce the tampon. The vaginal orifice is generally exceedingly patulous, by reason of the lacerated perineum and prolapsed vaginal walls, and a tampon of considerable size (as large as a duck's or even a goose's egg) can be pushed into the canal by the patient herself. In poor patients this possibility is a great advantage, not to be underestimated in those frequent cases where no permanent supporter can be borne. I show the women the size and shape of the tampon—indeed, generally give them one as a sample—tell them to smear its surface completely with lard or dip it in olive oil or glycerine, and then roll it in the astringent powder, generally tannin, which they will get by prescription at the druggist's. Then, lying on the back with thighs flexed and separated, they draw apart the labia with the fingers of one hand and steadily crowd the tampon into the vagina with the other, care being taken to leave the string by which it is to be withdrawn protruding from the vulva. Such a tampon should be renewed every twenty-four hours, the vagina first being cleansed by tepid injections. The tough, epidermoid mucosa of old prolapsed vaginæ bears this astringent treatment for months without becoming excoriated by the tannin and pressure; if, however, the epithelium begins to show signs of exfoliation, or if the vagina is tender, as in simple rectocele or cystocele, the tampon should be soaked in a solution of tannin in glycerine 1 : 4 or 6, and squeezed nearly dry before being introduced. When well crowded into place, the tampon should always be retained by a broad T-bandage covered by oiled-silk where it rests against the vulva. These tampons can be worn for months, each daily reapplication being preceded by a cleansing injection. It is well to omit the astringent occasionally and apply merely a glycerated or vaselined tampon, in order to avoid producing excoriation of the vaginal mucosa, or to alternate day by day with the astringent and emollient tampon.

4. *As a Mechanical Support and Stimulus to the Pelvic Vessels, and as an Alterative to the Pelvic Tissues by Means of the Direct Pressure it Exerts on them.*—In many cases the vessels of the pelvic organs, chiefly the veins, are in a state of chronic passive dilatation, the result of long-continued venous hyperemia. This hyperemia may be due to obstructions to the venous circulation in distant organs (as in congestion of liver and portal circulation, or cardiac disease), or more frequently at least, in the class of cases met with by the gynecologist, to subacute and chronic inflammatory con-

ditions of the pelvic organs (uterus, ovaries, and cellular tissue) themselves. The interruption to the circulation by intrapelvic exudations of lymph and the cicatricial contractions and adhesions resulting therefrom, is also a not unfrequent factor in this passive hyperemia. In such cases the pelvic tissues accessible to the touch, vulva, vagina (chiefly the upper portions), uterus and parametran cellular tissue, impart a puffy, doughy, at times nodular, sensation to the examining finger, similar to that afforded by edema in external parts. The vagina is generally relaxed, the uterus more or less displaced and enlarged, the ovaries tender and swollen ; and the parametrium, chiefly laterally and behind, exceedingly sensitive to touch. This last is particularly the case when there has been some, often entirely latent and unsuspected, pelvic cellulitis, or where there is a chronic inflammation of the numerous lymphatic vessels and occasional glands normally found in the pelvic cellular tissue.

Such patients complain of backache, weight and fulness in the pelvis, and bearing down. They are generally very much benefited by rest in bed and hot-water injections, the former of which remedies obviously only the better classes or hospital patients can sufficiently employ. As a substitute for this rest and as a support to the distended blood-vessels the tamponade of the vagina has been successfully employed. I first saw this method systematically described in print by Dr. V. H. Taliaferro, of Atlanta, Ga., in 1878. According to him, the solid packing of the vagina with cotton and wool is an excellent remedy in subinvolution, areolar hyperplasia, descensus and other dislocations of the uterus, chronic pelvic peritonitis and cellulitis, adhesions (and I would add), chronic ovaritis—conditions in which painting with tincture of iodine, hot injections, glycerine tampons, etc., are the usual remedial means. Dr. Taliaferro places the patient in the knee-breast position, which is preferable to the lateral semiprone position as a suspender of intra-abdominal pressure, and elevates the perineum with Sims' speculum. Air is thus admitted into the vagina, which is expanded like a balloon. A few, two or three, pledgets of cotton, soaked in glycerine and squeezed dry, are then packed into the fornix vaginæ with long dressing-forceps, and the remainder of the vagina is then filled with tightly packed loose balls of dry, finely carded sheep's wool, down to the floor of the pelvis. This packing should be done gently and carefully, but firmly, and the tampon should not reach to the vulva, or it might interfere with micturition and defecation, and give pain by its size. The sheep's wool should be carbolized, and is preferable to cotton on account of its elasticity. This tampon is to be renewed every two to three days. The annoying sacral and pelvic pains, and the feeling of dragging and bearing down, almost constantly met with in these cases, are said to disappear almost wholly after the first tamponade. The patients are not obliged to remain in bed, unless they prefer to do so. Any abrasions produced by the pressure in the vagina may require the interruption of the tampons for several days, or the wounds may be covered with linen strips smeared with vaseline. The tampons should in any case be applied loosely at first, and be gradually tightened. According to Taliaferro this dilata-

tion does not relax the normal vagina, and dilated vaginæ are incited to contraction by it. The cases reported by him are certainly striking examples of the good effects of this treatment, one uterus having been reduced from three and a-half to two, another from six to three inches, after two to four months' treatment. In one case an annoying gastric hystero-neurosis, with vomiting, was entirely cured by the local pressure. The therapeutical action of the tampon is said to be the following: The pressure diminishes, 1, the blood-supply and nutrition; 2, it increases absorption; 3, it destroys hyperplastic tissue by retrograde metamorphosis; 4, it diminishes nerve-activity; 5, it rectifies displacements. The following, according to Taliaferro, are the advantages of this method: 1. More rapid effect. 2. The patients are not confined to their beds by it; on the contrary, the support of the tampon affords them relief and enables them to walk about, while the ordinary measures (caustics, sponge-tents, etc., necessitate a more or less prolonged rest). 3. The entire prevention of sexual intercourse, a therapeutic auxiliary but seldom observed. 4. Absence of all inflammatory irritation. 5. Softening and dilatation of the tissues, while caustics and curettes toughen them. 6. Absence of destruction and removal of parts, whereby their integral condition is retained.

I have thus far quoted Taliaferro's description in abstract, but am able to coincide with him from a quite extensive experience with his method. I have repeatedly found this solid column of cotton (I have always employed cotton only) to be the only means of relief from the harassing backache in adhesion of a hyperplastic retroverted uterus, and have, after a few applications, toughened the parts so much as to permit the pressure of a pessary on the then partly replaced fundus. Of the value of this steady elastic pressure and support in reducing the size of an engorged hyperplastic or (better still) subinvoluted uterus, and restoring the normal circulation to the edematous and congested pelvic cellular tissue, I have no doubt whatever; neither of the potent alterative effect of this pressure on old peritonitic or cellulitic exudations and adhesions. An imperative condition for success with this treatment is that it be continued for a sufficient length of time—for months, perhaps, in very obstinate cases, for years. I have to add to Taliaferro's description merely, that it will usually be well to keep patients at rest for twenty-four hours after the first tampon, since I have met with many complaints from the pressure before the vagina has become accustomed to the distention and the sensitive parts to the pressure. One other condition in which I have employed the tampon with benefit, is a certain form of pachy-vaginitis, where the vaginal walls appeared thickened, edematous perhaps, and the surface is granular and rough (granular vaginitis). The pressure here, aided by the astringent effect of an aqueous solution of tannin in which the tampons are soaked, seems to have effected a cure more rapidly than the applications of solution of nitrate of silver and astringents ordinarily employed. The firm tampons cannot, however, be continued very long, as the vaginal surface will become rapidly abraded after a few applications, and the emollient pledgets must be substituted for the solid column.

If the vaginal mucous membrane does not seem to bear the pressure of moist cotton well, the tampons may be inserted perfectly dry and thereby some additional pressure be obtained through the extra elasticity of the dry material, or the first pledgets may be covered with vaseline as an emollient.

5. *As a Means of Dilating or Separating the Vaginal Walls—a Substitute for a Hard or Distensible Dilator—in Constriction of the Vaginal Canal after Operation for Vaginal Atresia or Stenosis, in Vaginismus and Spasm of the Levator Ani Muscle.*—The heading expresses the indications, and, to a certain extent, the method for the application of cotton pledgets in the conditions there enumerated. When it is desired to separate the vaginal walls after an operation for stenosis or atresia, or when the spasmodic contraction of the levator ani and perineal muscles prevents sexual intercourse, a hard-rubber or glass plug is generally introduced and retained as long as required. In the absence of such a plug, the vaginal walls may be separated, and the spasmodic muscular contraction overcome by dilating the canal with pledgets of cotton smeared with vaseline or soaked in glycerine, and packed in one after the other through a speculum, which is immaterial. The number of tampons will depend upon the amount of distention required ; they will not be retained longer than twenty-four hours.

6. *As a Hemostatic, by its Mechanical Pressure and Size.*—There were various methods of tamponing the vagina for uterine hemorrhage before the introduction of Sims' speculum, such as, 1, the crowding of as many pledgets of cotton, with strings attached, into the vagina through a cylindrical or plurivalve speculum, as the vagina would hold ; 2, the passage of a greased handkerchief or conical bag into the vagina over a speculum, and the filling of the bag to the mouth with pledgets of cotton ; the speculum was then withdrawn, and the tampon removed in due time by pulling on the bag or ends of the handkerchief projecting from the vagina ; 3, the roller-bandage, pushed up through or without a speculum, and removed by drawing on its projecting end. All these three methods, to a certain small extent, fulfil their purpose, at least, in so far that for a time the blood finds an obstacle, and coagulation is induced, until, generally in a few hours, the cotton becomes thoroughly saturated and the hemorrhage recommences. And it cannot well be otherwise, for the loosely distributed balls of cotton, in a dilatable canal like the vagina, and in the roomy vaginal fornix, exert almost no pressure on the source whence comes the blood, the cervical canal and external os, and therefore utterly fail in the object for which they were introduced, mechanical obstruction to the flow of blood from the uterus. All the good these loose cotton tampons do is for a time to arrest or mitigate the hemorrhage by entangling the blood in their meshes and favoring coagulation. But this benefit is merely temporary, and a speedy renewal of the tampon is required with the same result, until, finally, other remedies arrest the flow, or nature takes the matter in hand and removes its cause, by expelling the ovum, or placenta, or polypus, whichever the case may be ; or, finally, the patient succumbs. The addition of astringents to the tampons only renders their removal

more difficult by contracting the vagina, but does not arrest the hemorrhage, since the bleeding spot is not touched by the styptic. The tampons enclosed in a handkerchief or bag possess the advantage of being more easily removed, and the bag, if thoroughly distended, may exert a more steady pressure on the cervix than the loosely scattered tampons; but this advantage is slight. A better hemostatic than either is the roller-bandage, and probably better still, Foster's lampwicking tampon, already described, for both these tampons are in one piece, they are tightly packed, the wicking especially is very porous, and by its absorption of blood will form a pretty solid obstacle to further oozing. Other species of tampons, the dilatable rubber bags, so-called colpeurynters, certainly are useful and efficient in cases chiefly where the vagina is very distensible, as during pregnancy; and I have found a colpeurynter, distended to its utmost with cold water, not only the most convenient, but also the most efficient means of controlling hemorrhage and dilating the os in placenta previa. But for the non-puerperal condition they are generally inadmissible, because the amount of distention which they require to make them actually hemostatic is not long borne by the patient.

The loosely packed tampons, as above described, are still generally employed as hemostatics, and a large majority of the profession are yet ignorant of the only sure and efficient method of tamponing the vagina for uterine hemorrhage, namely, in Sims' position through his speculum. Only when that instrument is not at hand and the fingers cannot be used as a substitute through rigidity of the perineum or vagina, is the practitioner (the general practitioner, even) justified in trifling with his patient's health and life by resorting to the almost useless tamponing of the vagina through a cylindrical or plurivalve speculum in a case where the hemorrhage is so severe as to call for a tampon at all. Every practitioner who takes and is liable to meet with cases of uterine hemorrhage (and what general practitioner is not?) from miscarriage, fibroids, polypi, polypoid endometritis, cancer, should not only possess a Sims speculum, but know how to use it and how to tampon the vagina so securely that not a drop can escape so long as the tampon is retained. It is time that the old "let well enough alone" excuse be denounced, and that the eminent old-fashioned practitioner who "never lost a case" from hemorrhage or septicemia through retention of the placenta after abortion, and "never had occasion to sew up a lacerated perineum in a practice of twenty-five years," be convinced that not everything is good because it is old and he has "always done it and succeeded well with it;" and that he learn that the only proper way to apply a hemostatic vaginal tampon is in the manner about to be described. I was greatly surprised to see in a recent English work on the "Diseases of Women" (Edis) the statement that the tamponade of the vagina for hemorrhage was "unscientific, as well as very objectionable, and should never be resorted to." The author fails to inform us whether it would be more "scientific" to allow the woman to bleed to death unless the hemorrhage is arrested by internal remedies, or a sponge or laminaria tent is procured, which latter is his practice when the former fails; and he

also omits to explain wherein a properly disinfected and carefully applied column of tampons is unscientific when it is used merely as a temporary measure until the cause of the hemorrhage can be discovered or removed. The *first rule* in such cases is to *stop the bleeding by the very first remedy at hand;* the *second*, to discover the cause; and the *third*, to remove it. To Sims and his pupil, T. Addis Emmet, belong the priority of the following method:

The patient (with empty rectum and bladder) occupies the left lateral prone position; Sims' speculum is introduced and the cervix exposed. All coagula and fluid blood having been carefully removed by the dressing-forceps and damp cotton, a disk-shaped tampon about two inches in diameter and one-half inch thick is placed over the cervix. Another such tampon is rolled up and placed behind, another in front, and one on each side of the cervix, and a large flat one again over all these. These tampons are recommended by Emmet to be soaked in a saturated solution of alum and squeezed nearly dry. I always carbolize the tampons in a one per cent. solution, but think the alum solution a very good plan, as it contracts the vaginal pouch and thereby compresses the cervix. Occasionally it may be necessary to push a pledget of alum cotton into the cervical canal and thus arrest the hemorrhage until the whole tampon has been firmly placed. The oozing of blood between the layers of cotton hastens their offensiveness.

The first circle and layer of tampons having been arranged, as described, and the vaginal vault thus filled and the cervix compressed in all directions, disk after disk of dampened carbolized cotton (I do not think it necessary to alum these lower layers) is laid around the circle of the vagina, filling up the centre at the last, and each disk and each layer is gently but firmly pressed down and packed tight with the dressing-forceps. This pressure should always be made from the periphery toward the centre, or rather from the anterior vaginal wall toward the sacrum. As the cotton is thus welded and pushed up, the room thus made is filled by new pledgets, until the vagina is distended to its utmost and the tampon has reached not only the floor of the pelvis, but is parallel with the pubic arch. After a final thorough survey of the tampon and packing-down of any loose part, the dressing-forceps hold back the cotton firmly with widespread blades, and the speculum is carefully dislodged and removed with point backward. Considerable care is required not to dislodge the tampon in this maneuvre, and it is necessary after removal of the speculum to fill the space thus made by a fresh packing tight of the whole tampon, and perhaps by several additional disks. I always introduce two fingers and touch the surface of the tampon before considering the work done; in this way I am able to detect any imperfection in the packing, and remedy it by direct pressure. The whole process can be likened to nothing better than to the filling of a carious tooth with dry, soft pellets of gold-leaf. When the vagina is thus tamponed, there is absolutely no chance for blood to ooze through, and only after twenty-four hours or longer may the cotton gradually become soaked with the bloody secretion

from the uterus and a slight oozing from the vagina appear. But this is not hemorrhage—merely a sign that that particular tampon has done its duty and should be removed.

This tampon should not be retained longer than twenty-four hours. It becomes more or less offensive by that time, even when thoroughly carbolized ; besides, it is so easily replaced that it is better not to allow it to remain too long. While the vagina is distended by the tampon the bowels should not, and generally cannot be moved because of the obstruction of the rectum ; if moved, the tampon may be displaced and the hemorrhage recommence. When the tampon has been removed, an enema may be given ; or a laxative may have been taken beforehand, and the tampon is removed when its action is imminent. If the tampon is very large the bladder may require emptying by the catheter. Or, if the tampon has been placed so far down, its pressure on the neck of the bladder and urethra may give rise to pain and tenesmus ; in that case, the patient is placed in the dorso-gluteal position, and a small portion of the tampon, next to the urethra, removed with forceps or notched steel tampon screw. The removal of the tampon is an easy matter after the speculum has once been

Fig. 97.—Sims' Tampon Extractor, with Closed and Open Screw.

introduced. It is possible to remove the cotton without a speculum by guiding the tampon-extractor into the vagina, screwing it into the cotton, and removing piece by piece. But the farther it is necessary to reach into the vagina the more irksome does this process become, and I am therefore in the habit of introducing the speculum and removing all the cotton through it. The at first compact mass of cotton, which reached from side to side of the pelvic cavity, has become somewhat loosened by the utero-vaginal secretions, and it is not a difficult, although a delicate, task to introduce the blade of the Sims behind the tampon along the recto-vaginal wall. At first the speculum should be introduced only a short distance, and as the cotton is removed, passed up to its full length. If there is any difficulty, the first layers of cotton may be removed without a speculum, and the latter introduced as soon as room is made. Layer after layer of cotton is thus removed by the dressing-forceps until the vagina is emptied. A hot carbolized injection is then given, and if there is still hemorrhage the tampon is reapplied in the same manner. If the flow is slight, the tampon need not be so large, and the pledgets may be soaked in glycerine and water, which will soothe the vaginal walls heated by the astringent cotton.

By means of a tampon applied in this manner every uterine hemorrhage can be controlled, except, perhaps, during labor, when I think a col-

peurynter or Barnes' dilator preferable. In inevitable abortion or uterine fibroid or polypus, the hemorrhage will not only be controlled by the tampon, but the external os will be dilated and the cervix shortened by its pressure, and the diagnosis (if necessary) and radical treatment thus facilitated. In conjunction with these tampons, intra-uterine treatment for the final cure of the hemorrhage may be employed.

The difference between this method of tamponing the vagina and the employment of a column of tampons as supports to the uterus and pelvic vessels is only one of degree, the hemostatic tampon being much larger than the supporting or dilating tampon.

8. *As an Absorbent of Vaginal and Uterine Discharges and a Protective to the Sound Parts from Caustic Substances Applied to Uterus or Cervix.*—The object in introducing cotton into the vagina to absorb discharges from that canal or the uterine cavity, is to prevent these discharges from infecting, excoriating, or soiling the parts below, whether the epidermis of these parts be intact or abraded. Thus, in cancer of the cervix, or profuse discharge from the endometrium and endotrachelium in catarrhal inflammation of these parts, or in acute or chronic vaginal leucorrhea, tampons —best of absorbent cotton—are introduced into the vagina to catch the secretion and prevent it from escaping and excoriating the labia and adjacent parts, and soiling the linen. Such tampons are applied in the ordinary manner, disinfected, if necessary ; their size should correspond to the capacity of the vagina, and the frequency of their renewal to the amount of and character of the discharge. As with every other variety of vaginal tampon the vagina should be thoroughly cleansed of débris of detached epithelium and coagulated mucus and blood by copious injections immediately after the removal of the tampon and before the introduction of a fresh one.

The tampons are applied through either of the forms of specula, as already described, perhaps quite as easily and effectually through the cylinder as through either of the others.

It is by no means an unimportant matter to protect the labia, vulva, and thighs from excoriation by acrid vaginal discharges, which is particularly liable to occur even from an ordinary leucorrheal flow, in stout women, especially in warm weather. The usual astringent vaginal injections do not suffice for this purpose ; indeed, the very frequency with which they are required to be made, aids in increasing the tenderness of the vulvo-vaginal orifice. An absorbent tampon, previously saturated with an astringent and then dried, answers an excellent purpose in these cases.

It may be mentioned casually that an excellent application for excoriated thighs (acute intertrigo of the inguinal furrow and the cleft between thighs and genital organs) is the ordinary lead or diachylon plaster, *freshly prepared*, spread on English lint or linen and reapplied two or three times daily. This acts not only as a protective, but as a healing agent. Tampons introduced as absorbents of profuse utero-vaginal discharges should be renewed at least every twelve hours.

Professor B. S. Schultze, of Jena, uses the tampon as a means of diag-

nosing an endometritis. He states that the usual signs given in the books (tenderness of fundus on sounding, profuse serous discharge, suprapubic pain, etc.) are vague, wherein no doubt he is correct; and claims that the presence of pus oozing from the uterus is the only certain evidence of the presence of endometritis. To detect this pus and distinguish it from the secretions of the cervical and vaginal canals, Schultze employs a glycerine tampon of absorbent cotton, the surface of which is coated with a twenty-five per cent. solution of glycerole of tannin. This tampon is placed against the cervix through a speculum, the vaginal vault having first been thoroughly cleansed, and when removed after twenty-four hours the coagulated secretion of the uterus will be found on the tampon exactly opposite the os uteri. The cohesion between tampon and vaginal walls and surface of cervix is rendered so close by the contraction of the tannin that no uterine secretion can ooze past the tampon, and the glycerine attracts the watery secretions. On the tampon there will be found a small lump of coagulated uterine secretion; if normal, it is of glutinous appearance, transparent or but slightly opaque, perhaps tinged violet by the tannin; if purulent, the color is entirely different, opaque, yellow, or greenish. The difference between pus from the uterine cavity proper and pus from the cervix is, that the cervical pus is intimately blended with the peculiar tenacious secretion of that cavity, but the uterine pus is more or less distinct. This purulent secretion may not be constant, indeed is more common and profuse immediately before or after the menstrual period, or it may be retained a few days and then be discharged in one gush. Repeated examinations with the tannin tampon should therefore be made before deciding the diagnosis.

VI. APPLICATIONS TO THE ENDOMETRIUM.

The application of medicinal agents to the mucous lining of the uterine canal is naturally divided by anatomical and practical conditions into two sections: 1. Applications to the mucous membrane lining the cavity of the cervix, below the internal os, and 2, applications to the mucous membrane of the uterine cavity proper, above the internal os.

1. Applications to the Cavity of the Cervix.

The chief points of difference between topical applications to the cavity of the cervix and to the uterine cavity proper are the greater accessibility and tolerance of the former cavity. While any instrument or medicinal agent introduced through the internal os may set up violent neuralgic or inflammatory action in the uterus or its adnexa (as has already been stated in speaking of the use of the sound), the cervical canal is ordinarily very little susceptible to even the most severe treatment. The peculiar formation of the endotrachelian mucous membrane, and the comparatively isolated position of the cervix (so far as the contiguity of the peritoneum and large lymphatic plexuses situated between the broad ligaments is concerned), are probably the reasons of this tolerance. The mucous membrane

is composed of numerous racemose glands or follicles which, arranged in ridges and furnished with an abundance of fibro-cellular substratum, become still more dense and tough when they have been subjected to the continued irritation of a catarrhal inflammation. And this is the very condition when applications to the cervix are most needed and performed.

The *indications*, therefore, for applications to the cervical cavity are such conditions in which there is an inflammation, generally subacute or chronic, of the mucous membrane of the cavity, with more or less hypersecretion of the stringy, ropy mucus peculiar to that location. The various grades of this affection are comprised in the common term of "endocervicitis," for which hybrid word, that of "endotrachelitis" (*endo*, within, and *trachelos*, the neck) might well be substituted. They are all characterized by the profuse stringy discharge already referred to, which may be either translucent or discolored, according as there is merely a hypersecretion or an actual inflammation with loss of epithelium and suppuration. If this discharge has existed for any length of time, the lips of the os are eroded (not *ulcerated*, since there is only a loss of the epithelium, no actual loss of substance), and this erosion may after a time be accompanied by a hypertrophy of the papillæ of the mucous covering of the cervix (papillary erosion); or the follicles may become occluded, distended, and project from the cervix, forming the "ovula Nabothi," or they may dot the surface of the everted, red, secreting endotrachelium as small translucent specks (follicular erosion or cystic hyperplasia), Figs. 100, 101, and 102. When an endotrachelitis has existed for some time, the external os generally gapes, the lips roll out and the eroded, thickened endotrachelian mucous membrane appears to view, closely simulating true ulceration and, of course, increasing the circular erosion of the lips already spoken of (Fig. 98). From this gaping, eroded opening usually hangs a thick plug of cloudy, stringy mucus, which resists all attempts at removal by forceps and cotton, and has to be drawn and broken away, as it were, by force with a dry sponge on a holder, or sucked up by a syringe. This, then, is the class of cases in which local applications are required and, indeed, indispensable to a cure.

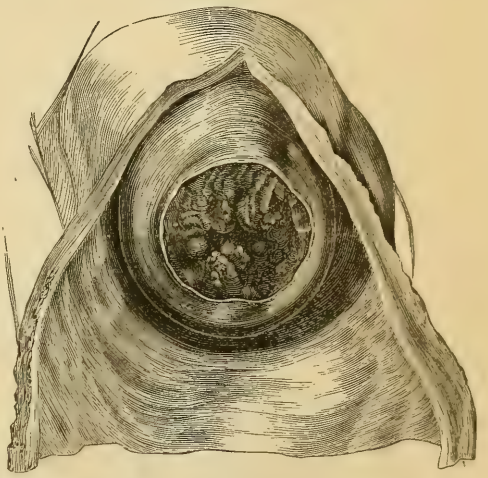


FIG. 98.—Circular Eversion of Mucous Membrane of Cervical Canal in a Subinvoluted Uterus, Simulating Ulceration (Barnes).

A fissure or laceration often precedes, indeed causes, this eversion (or ectropium, as it is also called), and the endotrachelitis is but a secondary

affair, the result of the laceration. In such cases it is usually indispensable to a permanent cure, after having reduced the catarrh and hyperplasia of the cervical mucous membrane, to close the laceration by an operation first devised and practised by Emmet, and now become deservedly popular as one of the greatest achievements of modern gynecological

FIG. 99.—Normal Nulliparous Cervix (P. F. M.).

FIG. 100.—Catarrhal Erosion of Cervix, Superficial Desquamation of Epithelium, First Stage. (Nullipara.) (P. F. M.)

surgery. Besides parturition, the common causes of endotrachelitis are exposure to cold, excessive coition, masturbation, and uterine displacements; in fact, everything which produces chronic pelvic congestion. A very common companion, or at least consequence, of chronic catarrh of the lining membrane of the cervix, is one of the forms of erosion of the vaginal mucous membrane covering the cervix and surrounding the external os. Such conditions are not uncommonly met with in virgins and nulliparous women, and to be successfully treated the endotrachelitis should first be cured by topical applications before the external erosion can be re-

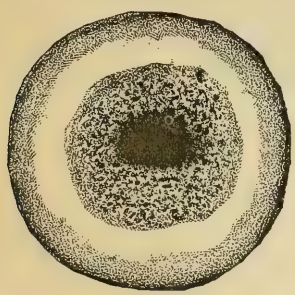


FIG. 101.—"Granular," Papillary Erosion of Cervix, entire Desquamation of Epithelium, Second Stage, with Hypertrophy of Papillæ. (Nullipara.) (P. F. M.)

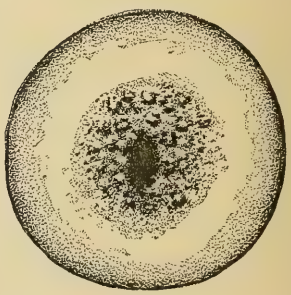


FIG. 102.—"Follicular" Glandular Erosion, with Papillary Erosion, Hypertrophy and Occlusion of Follicles, and Hypertrophy of Papillæ. (Nullipara.) (P. F. M.)

lieved. As a rule, both affections can be treated at the same time. It is a matter of experience that such catarrhal affections of the cervix, complicated by eversion or not, do not recover under mild applications by means of astringent injections, or even with hot-water irrigation. While the latter undoubtedly relieves the congestion and prepares the way for

a cure, stronger topical agents are needed to remove the thickened mucous membrane and set up fresh healthy action in the tissues.

A frequent indication for topical applications to the cervix is the spread of malignant disease up from the external os ; but such applications require to be of the most powerful agents.

In areolar hyperplasia of the uterus, particularly if the cervix shares to a marked degree in the enlargement, the introduction of alteratives into

Fig. 103.—Cervical Mucus Syringe. A piece of rubber tubing slipped over the nozzle of this syringe often answers very well to draw tenacious mucus from the cervical canal.

the cervical cavity may aid in the resolution of the hyperplastic tissue, but such applications would be restricted to cases in which the more efficient introduction of the agent into the uterine cavity proper is inadmissible.

Agents.—To be of any service in the chronic, notoriously intractable catarrh of the cervical cavity, applications must be thorough and powerful. Whatever, therefore, can safely be applied to the outer surface of the vaginal portion of the cervix may (with somewhat less safety, but still properly) be used in the cervical canal. But the internal os should (except in the cases hereafter to be specified) always be regarded as the limit of such powerful measures.

We may thus apply the fuming nitric, pure carbolic, or chromic acid to the cervical cavity ; or the solid stick of nitrate of silver ; or, if we desire to produce a decided slough, as in malignant disease, the saturated solution of chloride of zinc (as described under Applications to the Cervix) or the caustic potash or solution of pernitrate of mercury, or, what is often better still, the actual cautery. But it is all-important to remember that the sloughs of all the substances named, from the nitric acid to the nitrate of mercury (excepting only the pure carbolic), produce cicatricial contraction, and that they should therefore not be applied to a cervical canal unless such contraction is desired. A mere superficial application, however, will produce no slough and no contraction, especially if nitric acid is used. This agent, therefore, is a very useful remedy in chronic endotrachelitis, characterized by hypersecretion and enlarged follicles. Another excellent application in this affection is the iodized phenol (tincture of iodine and pure carbolic acid, equal parts) which may be applied every other day or oftener, until the cervical cavity assumes a more healthy appearance. When this occurs, no matter what the agent used, a milder application, such as plain tincture of iodine, tannin and glycerine (equal parts), or tannin in powder, or iodoform and tannin, or the pencil of sulphate of copper or zinc, or, what is best of all, a solution of nitrate of silver (℥ ss. to ʒ j. to ℥ j. of water) should be applied every two or three days until healthy epithelium covers the eroded mucous membrane.

When the tough mucous membrane and enlarged glands resist even the strong escharotics first mentioned, we might resort to the last two in the list of strong agents—the acid pernitrate of mercury and the caustic

potash (potassa fusa, or potassa cum calce, which latter is preferable because it is not so powerfully caustic and does not diffuse). But the effect of these two diffusible agents is not so easily controlled, and we cannot tell whether the slough produced and the cicatricial contraction ensuing may not largely exceed safety and our wishes.

A far safer and also, I think, more efficient escharotic is the actual cautery, applied either as a hot iron, or the dull red platinum tip of a galvano-caustic battery or the thermo-cautery. Its application is instantaneous, not painful, and the slough formed is not too deep if the heat is not too intense and its contact too thorough. In the cervical cavity this application is generally perfectly safe ; beyond the internal os, however, its use becomes decidedly hazardous. Should this agent fail, or should it appear desirable to remove the hyperplastic follicles more rapidly, and at the same time stimulate the mucous membrane thoroughly, we may do so with an instrument which we have entirely under control, namely, the sharp cutting curette of Sims (see chapter on Curetting). With it the hyperplastic tissue is removed with ease, rapidity, safety, and comparative absence of pain. It is well to paint over the fresh surface with tincture of iodine or a solution of nitrate of silver immediately after the curetting. Sims says that without the sharp curette he would despair of curing very many cases of chronic endotrachelitis. If thoroughly done, the curetting will not require repetition.

In a large proportion of cases, almost exclusively in single or sterile women, the endotrachelian catarrh (and, *post hoc* and *propter hoc*, the sterility) is due to a narrow external os, which prevents the free discharge of the normal cervical secretion. The pent-up discharge gradually becomes acrid, irritates the cervical mucosa, which pours forth a fresh supply ; this increases the irritation, until we finally have a decided catarrhal inflammation of the cervical canal and a dilatation of its follicles. It will give but temporary relief to remove the retained discharge with a cervical syringe or cotton-wrapped stick. Indeed, the viscid, tenacious, discolored (yellowish or brownish) mucus frequently resists all efforts for its removal. The curette cannot be introduced through the narrow os, and even if the follicles were scraped away the disease would return, because the primary exciting cause, the constricted external orifice, still exists. We must, therefore, begin the treatment by enlarging this orifice, and this may be done either with the dilator or the knife. When a thick plug of mucus is seen hanging from the external os, or the removal of the sound from the uterine cavity is followed by a gush of viscid mucus which has been liberated by that instrument, we can generally assume that the case is one of retention of endotrachelian secretion, and that our first step should be to give that secretion a free outlet. The condition in such cases is explained by the accompanying cut, which shows a long cervix with narrow external orifice and its cavity dilated by the accumulated secretion, the viscidity of which prevents its flowing through the small outlet, as a fluid discharge probably would. I have frequently procured the expulsion of this accumulation in a gush by pressing on the posterior surface of the

cervix with the finger or depressor. The indication in such cases is to dilate or incise the external os sufficiently to permit the free escape of the secretion. A dilatation will doubtless suffice for temporary relief, but the orifice will certainly contract again unless the dilatation is frequently repeated. We should remember that applications to the cervix will probably be needed for some time, and that patency of the cavity is desirable for that purpose; further, that it is not only the endotrachelitis which we must cure, but also the sterility so generally accompanying the catarrh. We must not only remove and prevent the re-formation of the acrid, tenacious mucus, which prevents the spermatozoa from passing into and through the cervical canal, but we must also keep the door sufficiently open to give them free admission. We must, therefore, secure permanent patency of the external os, and this is best attained by a combination of the two methods, the knife and dilatation. I should advise, first to incise the lips of the external os, not bilaterally only, but quadrilaterally—make what is known as a crucial incision, and make it so deep as to open the external os nearly or quite to the size of the dilated cervical canal (as shown by the dotted lines in the cut, Fig. 104). The particulars of this little operation are given in the section on Dilatation of the Uterus by Incision.

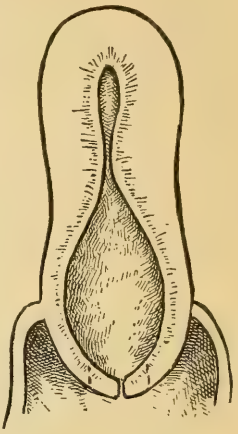


Fig. 104.—Dilatation of Cervical Cavity and Retention of Mucus in Endotrachelitis by Narrow External Os. Dotted lines show incisions (P. F. M.).

The division of the external os uteri, when performed for cervical catarrh, is best followed at once by the thorough use of the sharp curette (as hereafter to be described), and the scraped surface is immediately cauterized thoroughly by one of the stronger caustics, of which chemically pure nitric acid is by far the most efficient. When the slough of this application has separated, milder caustics, such as the iodized phenol, solid stick of nitrate of silver, or sulphate of copper or zinc, pure carbolic acid or tincture of iodine should be employed once or twice a week until the catarrh is cured. Should the external os show a tendency to contract during this treatment, it must be kept patent by dilatation with a steel screw-dilator, and perhaps by a cotton plug slipped from the applicator. If thought desirable, this plug may be soaked in iodized phenol, tincture of iodine, or carbolic acid, whereby a more lasting effect is obtained.

The cure of an endotrachelitis of long standing is always a matter of several months, perhaps even a year or longer. A speedy recovery should, therefore, never be promised, although the hope of a sure cure may generally be held out. Relapses, however, are very liable to occur, and this fact should be mentioned in stating the prognosis to the patient. It is well to bear in mind that pregnancy increases the hypersecretion from the endotrachelium, especially if the cervix is lacerated and everted, and that no treatment but *very* mild local astringents in injections should be used until after delivery. The small operation just described, as well as all ap-

plications to the endotrachelian cavity, are best performed through a Sims' speculum—that is understood. Still, a large tubular or bivalve might answer very well.

Counter-indications and Dangers.—The *counter-indications* to the application of caustics, or the curette to the cervical cavity, are always (besides the invariable one of pregnancy) the presence of acute or subacute inflammation of the uterus or its adnexa. The *dangers* are the rekindling of such inflammation, if it once existed, or of producing it for the time, if the patient happens to be in a susceptible condition. Thus, in a case of operation for laceration of the cervix, in which a small cervico-vaginal fistula remained at the angle of the laceration, the remainder of the rent having fully united, the cauterization of the fistulous track with the stick of nitrate of silver resulted in a circumscribed pelvic cellulitis of the size of half a lemon in the supra-vaginal cellular tissue immediately adjoining the fistula. This exudation disappeared in two weeks and the fistula then proved to be healed. There are the same counter-indications to, and the same dangers from, any application to the uterus. A careful examination and perhaps previous experience with the case will enable the physician to judge whether his patient is likely to bear local treatment well.

When, however, the circum-uterine inflammation is confined to the lymphatic vessels and glands it should be considered that this very lymphangitis may be due to transmission from the inflamed cervical mucous membrane, and that, so long as the catarrh exists, the sympathetic lymphangitis persists with it. The catarrh must therefore be treated if the lymphangitis is to be relieved. The question in these cases as to the safety of local treatment is merely one of differential diagnosis between chronic pelvic lymphangitis and lymphadenitis and chronic pelvic cellulitis, a distinction not so very difficult to the practised touch, if one remembers that inflamed lymphatic glands are generally movable and exist on either side of and behind the cervix only as small bean-like bodies, and that lymphatic vessels are tortuous and movable, whereas the exudations of chronic pelvic cellulitis are irregular, flat, entirely immovable, and usually less painful nodules. In lymphangitis, also, the uterus is movable; in chronic cellulitis, more or less fixed.

The *precautions* to be employed will, therefore, depend upon the exigencies of each case. Still, the general rule should be observed, not to apply any caustic agent so thoroughly as to cause a mutilation of the cervix by the slough it produces, therefore to be careful to apply such caustics as are followed by cicatricial contraction (nitric acid, chromic acid, solid nitrate of silver, acid nitrate of mercury) only to a cervical canal which is larger than it should be, and which will permit such contraction without injury to the future health of the patient. Nitric acid, when deeply applied, will cause a slough; but if touched but lightly on an abraded surface produces merely a superficial film of albuminate, and acts more as a stimulant than a caustic. We should therefore apply it thoroughly only when we wish to destroy tissue and produce cicatricial contraction. By bearing this rule in mind, the frequent cases of stenosis of

the cervical canal and external os will be avoided which are met with by gynecologists as the result of the careless application of nitric acid. The same applies quite as much to the solid nitrate of silver.

Methods.—Whichever speculum will thoroughly expose the cervical canal and permit the introduction of an applicator or curette into it will answer for the purpose of endotrachelian medication. The nitrate of silver or sulphate of copper stick is applied by a long caustic holder or in a quill, or held by long dressing-forceps; the chromic, carbolic, and nitric acids and nitrate of mercury on a glass or wooden rod. The wood soaks up the fluid and prevents its dropping, and is therefore preferable to the glass. The iodine, iodized phenol, etc., are best applied by a brush or cotton-wrapped screw-stick, which, of course, can be equally well used for the other agents if care is taken to carefully wipe off all excess from the cotton. As in making applications to the surface of the cervix, the vagina should be protected from any excess of the fluid by packing a layer of cotton wadding under the cervix, which cotton may be soaked in oil, salt-water, or a solution of bicarbonate of soda to neutralize the caustic, and is removed with the speculum.

It is well to mop up the excess of the strong caustics before placing the usual vaseline or glycerine tampon over the cervix. But if a more thorough effect is desired from the milder alteratives and stimulants (iodine, iodized phenol), the cotton plug described above may be soaked in the agent and introduced on the slide applicator, to be removed after eighteen to twenty-four hours. The powders (iodoform, iodoform and tannin) are either thrown into the cervix by a spoon or spatula, or blown in by an insufflator, and are allowed to remain until eliminated with the vaginal secretions. If it is desired to deplete the cervix and allay irritation, a glycerine tampon should be applied; but if the effect of the application is to be astringent, a vaseline tampon is preferable. The sloughs from the strong caustics come away in from five to seven days (or more, if very deep); the albuminate formed by the milder agents disappears within two days. The time for repetition of the application varies therefore with the character and strength of the agent applied, the thoroughness of its use, and with the severity of the affection. Strong caustics require to be applied only once or twice, to be followed by the milder agents, which should be used two or three times a week as long as the case calls for them, and may need frequent changing.

I have devoted so much space to the discussion of applications to the cervical canal, because catarrhal hypersecretion of that part is exceedingly common and a very frequent, often unsuspected, cause of sterility and annoying backache; further, because its treatment should be energetic to be successful, and even then is not likely to anticipate the expected period of cure.

2. Applications to the Mucous Membrane of the Uterine Cavity Proper.

The indications for intra-uterine applications are exceedingly simple. They may be enumerated under five heads: 1. Endometritis, or uterine catarrh, in its chronic form. 2. Hemorrhage from the cavity of the uterus. 3. Subinvolution and areolar hyperplasia of the uterus. 4. Intra-uterine vegetations, or malignant disease. 5. Defective development, or atrophy of the uterus; amenorrhea.

1. *Chronic Endometritis.*—Although Emmet ignores the existence of this disease, I confess I do not understand why there should not be a catarrhal affection of the mucous membrane of the uterine cavity as well as of all other mucous membranes in the body; and I do not see how an endosalpyngitis, which he admits as the result of venereal infection, can exist unless by direct transmission of the virus through the mucous membrane of the uterine cavity. Call it what we will, there certainly are numerous cases in which that mucous membrane is in a condition of chronic hyperemia (produced by exposure to cold, over-exertion, excessive coition, repeated miscarriages, sluggish portal circulation, etc.), which hyperemia may gradually result in hyper-secretion, which again produces a maceration of the intra-uterine epithelium and an increased muco-purulent discharge. The diagnosis of chronic endometritis may be made either from the oozing of this muco-purulent discharge from the os (its intra-uterine origin being distinguishable from the cervical by the entire absence of the viscidity peculiar to the latter, and by the tampon test of Schultze, already described), or from unusual tenderness or bleeding of the endometrium on careful sounding, or from a conjunction of these signs together with otherwise unexplained abdominal weight and dragging pelvic pains. The occurrence of menorrhagia may confirm the diagnosis.

It is of very little avail to treat this affection, when once it has become chronic, by other than local means, by agents applied directly to the endometrium. The analogy between chronic, nasal, laryngeal, and uterine catarrh in this respect is perfect.

The indications for the treatment of a chronic endometritis are sufficiently explicit and numerous: the exhausting drain of the discharge, the aching, dragging pain in the lower abdomen, the constant backache, the reflex neuralgiæ, lastly, the sterility induced by the discharge and the unfavorable condition of the irritable endometrium for nidation of the ovum, all these are sufficient reasons why the disease should not be neglected. Besides, the discharge from the uterine cavity is very prone to irritate the endotrachelium and produce a hyper-secretion from that part. Indeed, I dare say there are comparatively few cases of pure, uncomplicated chronic endometritis. The cases, however, in which the catarrhal affection has not spread above the internal os are by far more common. Again, a discharge from the uterus may produce a vaginal catarrh, and so the annoyance increases.

In conjunction with remedies applied directly to the endometrium, the

usual depleting measures for the pelvic organs are indicated, such as glycerine tampons, hot injections, saline laxatives; and the general health needs building up.

2. *Uterine Hemorrhage.*—The causes of pathological hemorrhage from the mucous membrane of the uterus may be either constitutional (cardiac, hepatic, or renal disease, acute febrile affections, exanthemata, hemorrhagic diathesis, abdominal plethora), or local (polypoid degeneration, or hyperplasia of the uterine mucosa, fibroids of the uterus, malignant disease of the uterus, laceration of the cervix, endometritis, ovarian congestion), or a combination of both. To treat uterine hemorrhage depending on one of the above-named constitutional causes by local applications would manifestly be irrational and of but temporary benefit. And equally futile would it be to give hemostatic medicines for the arrest of a metrorrhagia caused by polypoid vegetations or cancerous disease. As regards fibroids, however, agents which cut off the blood-supply from the tumor by contracting the uterus, notably ergot, form a decided exception to this rule. But the hemorrhage from the villi of a cervical epithelioma or a hyperplastic uterine mucosa is very little affected by general hemostatics. The best results are undoubtedly obtained by combining both methods of treatment; and I am, therefore, in the habit of prescribing hemostatic medicines (ergot, gossypium, cannabis indica, aromatic sulphuric acid, etc.), while using local medication. A radical cure will, however, be achieved only by such treatment as removes the cause, constitutional or local, of the hemorrhage.

In making the diagnosis of uterine hemorrhage it may be well to exclude hemorrhage from the vagina or cervix (as in laceration or malignant disease of the cervix) before deciding on the proper medication; and this is done by exposing the parts with the speculum.

The effect of topical hemostatic remedies is usually a rapid one, but they may have to be frequently repeated unless the cause of the hemorrhage is at the same time removed.

3. *Subinvolution and Areolar Hyperplasia of the Uterus.*—An exceedingly common affection with all women who have miscarried or borne children is deficient involution of the uterus. This may depend on local factors which interfere with the proper physiological involution of all the genital organs after childbirth, such as local injuries to the uterus and adnexa (laceration of cervix or perineum, displacements of uterus), pelvic peritonitis or cellulitis, too early rising from the lying-in couch, endometritis, metritis; or it may be due to constitutional debility and want of tone. A subinvolution of the uterus, which is neglected or does not yield to remedies, does not, in my opinion, remain a *subinvolution* always; but, after a certain period, varying between several months and several years, the intermuscular cellular or areolar tissue begins to enlarge and gradually encroaches upon and compresses the formerly abnormally developed muscular fibres, the latter lose their softness and succulence, and the areolar tissue becomes dense, and at last almost fibrous; the soft subinvolution has passed into the hard *areolar hyperplasia.* In the words of Scan-

zoni, the father of "chronic metritis," which is identical with what we now call areolar hyperplasia, the stage of infiltration merges into that of induration. Skene calls the latter condition sclerosis of the uterus. The large majority of cases of areolar hyperplasia, in my opinion, date from a miscarriage or confinement, subinvolution, of course, being the initial stage of the affection. But rarely do I meet with a case of diffuse areolar hyperplasia of the whole uterus in a nullipara. Still, I will not deny that causes which produce and maintain a chronic congestion of the uterus (such as repeated temperature shocks, excessive or unnatural coition, cold syringing after intercourse, unsatisfied sexual excitement) may in time produce a condition identical with areolar hyperplasia.

The local symptoms (pelvic weight, pressure, backache, dysuria, dyschezia, ovaralgia) and the constitutional signs (the various hystero-neuroses, general anemia, melancholia, etc.) present an array of ailments so distressing and persistent as to call for any means by which relief may be obtained. Among such means undoubtedly are the intra-uterine applications of stimulating, absorbent, and alterative agents. But to be of service such applications should be thorough, persistent, and frequent, far more so even than in chronic endometritis, and they should always be combined with hot-water injections, glycerine tampons, saline laxatives, and general tonics.

4. *Intra-uterine Vegetations or Malignant Disease.*—While some gynecologists, disciples of Lombe Atthill, of Dublin, still endeavor to destroy vegetations of the endometrium by the application of powerful caustics, chiefly fuming nitric acid, the majority follow the lead of Sims and Thomas, and remove the vegetations with the curette, preferably the blunt instrument of Thomas. This latter method is so much more effectual, rapid, convenient, and safe than the tedious, painful, and more or less superficial cauterization, that with us the curette has become the favorite means of treating polypoid endometritis. But cases are not unfrequently met with in which a more positive local effect seems necessary than the mere scraping of the vegetations, cases in which a deeper layer of the endometran mucosa requires to be removed than would be justifiable with the curette; and here it may be necessary to supplement the curetting by an application of fuming nitric acid, chromic acid (1 : 2), iodized phenol, or solution of persulphate of iron. Such cases are generally those in which the hemorrhage continues or returns after the scraping, and the repeated use of the curette fails to remove additional vegetations. The ectatic and debilitated blood-vessels of the endometrium seem unable to contract, and the only means of preventing the oozing from their torn and gaping orifices is to utterly destroy them. This, one of the caustics named effectually does, and after the separation of the slough a new, and presumably more healthy, mucous membrane has been formed. It is evident that unusual care should be employed not to apply the escharotic too deeply to the denuded endometrium. But there are other cases in which an application of a milder caustic, astringent, or alterative is beneficial after curetting, and these are, when the uterus is subinvoluted, hyper-

plastic, flabby, apparently incapable of energetic contraction and involution ; cases when the continued passive hyperemia of the organ, after the removal of the vegetations and the pulpy, thickened mucous lining, will soon result in the reproduction of the vegetations. In such cases I always swab the uterine cavity with Churchill's tincture of iodine, in bad cases even with iodized phenol, and perhaps leave a plug of cotton soaked in the fluid in the cavity for twenty-four hours. These applications need weekly repetition, or oftener, and then serve also to fulfil the previously mentioned indication of reducing uterine subinvolution or hyperplasia.

To attempt the radical removal of these vegetations by the frequent application of milder caustics and alteratives would be a mere waste of time.

Experience has taught me that simple curetting, even though thoroughly done, does not usually suffice to permanently prevent the re-formation of the vegetations and the return of the menorrhagia. Hence I have for a number of years made it a rule, not only to mop the uterine cavity carefully with compound tincture of iodine (usually the cotton plug just described) but also to continue these applications with simple tincture of iodine twice a week until at least two menstrual periods have been normal, and then gradually reduce the applications to one a week, one in two weeks, and one before the period, until I could feel sure of a permanent cure. In this way I have avoided the failures which I have several times seen in cases curetted by other gynecologists, who had neglected the, in my opinion, indispensable after-treatment.

In malignant disease of the endometrium, which occurs chiefly in the form of diffuse sarcomatous degeneration of the mucosa, more rarely as true carcinoma, the treatment is, first to thoroughly remove all the soft portions of the growth with the curette (now preferably the sharp scoop, as more effectual), and then apply as strong a caustic or escharotic as the thickness of the underlying uterine wall seems to warrant. Pure chromic or nitric acid, or an alcoholic solution of bromine (1 : 5) are generally used for this purpose, or if a styptic effect is also desired, the solution of the persulphate of iron, pure or mixed with equal parts of glycerine. A very good styptic, although in no sense a caustic, is the saturated solution of resin in alcohol, known as James' styptic, which acts by covering the bleeding surface with a film of resin after evaporation of the alcohol.

5. *Defective Development of the Uterus ; Amenorrhea.*—This condition may be either *congenital*, the uterus never having attained the size natural to a well-developed woman ; or *acquired*, the uterus having receded from its normal state, which usually occurs as the result of excess of involution after childbirth, or after some wasting constitutional disease (typhoid fever, tuberculosis, cancer in other organs). Very frequently the ovaries participate in this imperfect development or atrophy.

The exudations accompanying and often persisting after local or general peritonitis by compressing the ovaries and interfering with normal ovulation may also produce amenorrhea. Treatment of any kind is usually of little avail in such cases.

Besides such general remedies and measures as are likely to stimulate the whole system, and thus also the sexual organs, much may be accomplished by local irritation and stimulation by means of hot vaginal injections and applications to the endometrium. The agents used to the uterine cavity are merely such as will irritate the organ and attract a greater supply of blood to it. The astringents and alterative-astringents, like zinc, copper, iodine, nitrate of silver, would not be indicated. The chief agent used is carbolic acid, either the pure concentrated solution, or Squibb's impure acid (coal-tar creasote), and its counterpart, pyroligneous acid, diluted with an equal amount of glycerine. This must be applied two or more times a week, most thoroughly during the week just preceding the expected menstrual flow. And the applications must be continued

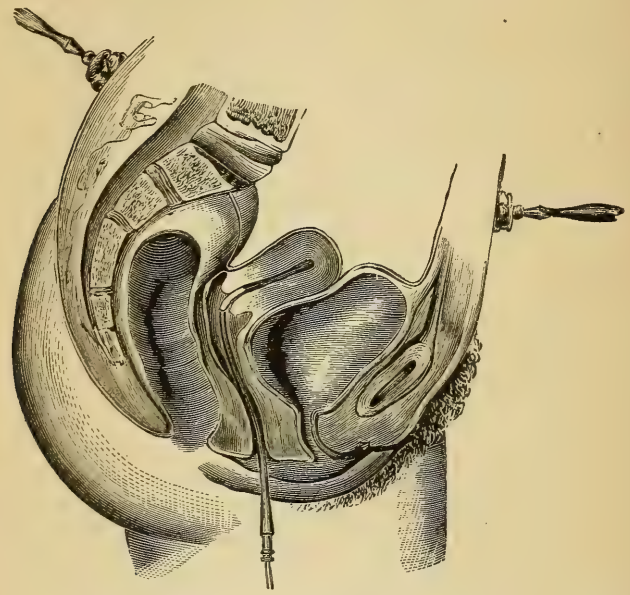


Fig. 105.—Uterine Electrode as Applied for Electrization of the Uterus (Beard and Rockwell).

for many months until benefit is obtained, or the futility of the treatment recognized. But a much more efficient stimulus to the undeveloped or atrophic uterus, and at the same time to the ovaries, is the interrupted or faradic electric current. This may be applied to the endometrium by means of an insulated steel sound, the other electrode being placed alternately on the abdomen over the fundus uteri and each ovarian region, or over the sacrum ; the strength of the current and the length of the sitting will depend on the sensibility of the patient, and should gradually be increased, until the full strength of the battery is applied and the sitting lasts thirty minutes. As with the medicinal application, so should the electricity be applied most thoroughly immediately preceding a menstrual epoch, and two or three times a week or oftener in the interval.

In obstinate cases, where the amenorrhea depends on sluggish circula-

tion through a subinvoluted uterus (as in fat, plethoric women), the constant current may be used three or more times a week, and at the proper time of menstruation the faradic current in interrupted shocks as powerful as the patient will bear should be applied, when the flow may at once appear.

In some cases amenorrhea does not depend upon deficient development or atrophy of the uterus or ovaries, but rather on a sluggish pelvic circulation and a want of innervation of the ovaries. Such cases are usually those of women who either have had children or are sterile, and about their thirtieth year rapidly grow stout and with their increasing weight gradually become amenorrhoic. In such women the nerve-force formerly expended on their ovaries and sexual functions appears to have been deflected by unknown causes to their assimilative processes. The prognosis both for the amenorrhea and sterility is generally poor in these cases, unless the nerve-force can be returned to its proper direction and equalized throughout the whole system. As soon as we reduce the flesh of these women their menstrual flow increases and there is a *chance* of their conceiving. But how to reduce the flesh is the problem which has vexed many a practitioner. The Banting, or milk cure, Kissingen, Saratoga, Kreuznach, Carlsbad, or Marienbad waters, moderate diet, exercise, chiefly horseback riding, and general and local massage—all these measures should be tried. And with these local treatment is indispensable; electricity, carbolic acid, hot injections; and if the uterus is hyperplastic, as is usually the case with parous women of this class, frequent moderate depletion by leeches and scarification to empty the overloaded vessels and stimulate the circulation. By persisting in bringing on a flow of blood from the uterus every four weeks, in course of time the spontaneous periodicity of the catamenia may often be restored.

Agents and their Therapeutic Uses.

According to the indication, the medicinal agents applied to the endometrium are divided into:

1. Caustics: Mild—nitrate of silver, iodized phenol, carbolic acid, pyroligneous acid. Strong—nitric acid (chemically pure; fuming is not necessary), chromic acid, acid nitrate of mercury, bromine, chloride of zinc, actual cautery.
2. Astringents and Styptics: Sulphates of zinc, copper, alum, nitrate of silver, tannin, persulphate or perchloride of iron, tincture of iodine, hydrastis, eucalyptus, resin, pinus Canadensis.
3. Alteratives: Iodine, iodoform, iodized phenol, galvanic current.
4. Stimulants: Carbolic acid, faradic current.
5. Narcotics: Opium, belladonna, iodoform, cocaine.
6. Disinfectants: Carbolic and salicylic acid, thymol, permanganate of potash.
7. Oxytocic: Ergot.

Caustics.—The milder caustics are used chiefly in chronic catarrhal conditions of the endometrium; the strong caustics, when it is desired to produce a more decided impression, or form a slough, as in hemorrhage from diffuse hyperplasia of the uterine mucosa, and in malignant disease.

The actual cautery has already been described under applications to the cervical cavity. Its employment in the cavity of the uterus proper is too dangerous to admit of its being recommended. The effect and extent of the cautery cannot well be regulated, and even expert operators have done mischief with it. Thus I saw one gentleman, an expert in galvano-caustic therapeutics, perforate the fundus uteri with the galvanic tip (as shown by the autopsy) when only cauterization of the cervical canal was intended. The only way in which the actual cautery can be applied with any degree of safety to the endometrium is by means of the platinum tip of a galvano-cautery battery, which is introduced *cold* to within one-half inch of the fundus, the current then turned on and the tip immediately withdrawn.

Astringents and Styptics.—These agents are used in very much the same class of cases as the milder caustics; besides, in menorrhagia or metrorrhagia, whether proceeding from local or general causes. In chronic endometritis, at the beginning of the treatment, the best local remedies probably are: the nitrate of silver (gr. 20 to ʒ j. to the ounce), carbolic acid (pure or equal parts with glycerine), iodized phenol (pure in aggravated cases). When the superficial film produced by these agents has come away (in from three to five days), the astringents come into play, and then the sulphates of zinc, copper, or alum (ʒ j. to the ounce, or saturated solution), or tannin (pure or with iodoform, equal parts), persulphate or perchloride of iron (best mixed with equal parts of glycerine), will be found more beneficial than the continuance of the caustics. Still, a repetition of the caustic previously used, or a new one may be called for, if a trial of one or more of these astringents proves ineffectual in the course of a few weeks.

It should be particularly remembered that chronic corporeal endometritis is quite as intractable a disease as the same condition in the cervical canal, and that perseverance, caution, and avoidance of all preventable risks on the part of the physician, and patience and strict attention to directions on the part of the patient are requisite to a successful termination of the treatment. Further, that a change from one remedy to the other, from caustics to astringents, and back to caustics again, trying different strengths of the same agent, and occasionally giving the patient a week's rest, are essential points in the treatment.

If the patient suffers from metrorrhagia as a symptom of endometritis agents should be chosen for intra-uterine application which possess a styptic or astringent property besides their caustic effect. Such are the nitrate of silver, iodized phenol, and tincture of iodine, and all those mentioned in this section. The application of carbolic acid, for instance, would increase the hemorrhage, although it might possibly benefit the catarrh. When the metrorrhagia is the only symptom for which the application is made, the

astringent indication should predominate in the choice of the remedy, and the stick of silver nitrate, or saturated solution of chloride of zinc, or Churchill's tincture of iodine, or persulphate of iron and glycerine, or tannin in stick with glycerine, or alum, zinc, or copper pencils may be introduced. Pure nitric acid acts as an excellent hemostatic in a different manner, by destroying the bleeding vessels.

The resinous agents (fl. extr. hydrastis, eucalyptus, and pinus Canadensis) act chiefly by their astringent and stimulant properties, but are too mild to be useful as hemostatics. The mechanical action of the alcoholic solution of resin as a styptic has already been referred to.

Alteratives.—Besides acting as caustics and astringents, the iodized phenol and tincture of iodine possess a local alterative property which is likewise peculiar to another iodine compound, iodoform. Their use is indicated in chronic endometritis when it is desired to promote the absorption of a hyperplastic mucous membrane, and set up a fresh and healthy action in place of the subacute or chronic inflammatory condition. In this sense these alteratives are also stimulants. The iodoform is also very mildly anesthetic. Besides stimulating the mucous membrane, alterative applications to the endometrium excite a subinvoluted or hyperplastic

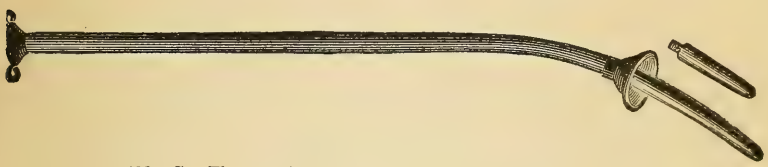


Fig. 106.—Cup Electrode for Galvanization of Uterus (Beard and Rockwell).

uterus to contraction and to absorption of its pathological constituents. This they do both by local stimulation of the circulatory and absorbent apparatus, and through the general system after their absorption. That agents applied to the endometrium are absorbed, and that very rapidly, is proved by the peculiar taste of iodine, carbolic acid, or iodoform experienced in the mouth of the patient in less than ten minutes after the application.

An excellent alterative is the constant galvanic electric current, passed through the uterus by means of a probe-shaped electrode introduced into the cervical canal with a cup attached into which the cervix fits. (Fig. 106.) The sponge electrode is placed over the abdomen or spine, a large flat sponge being most serviceable. If the endometrium proper is to be acted upon (for instance, in membranous dysmenorrhea), the electrode shown in Fig. 105 may be employed. A metal ball or olive, covered with chamois leather and attached to a long insulated stem, is a very convenient electrode for the surface of the cervix and the vaginal vault, and is the form I generally use in galvanization for chronic cellulitis, peritonitis, and ovaritis, the flat sponge being placed either over the abdomen, sacrum, or hip, the latter when sciatica is complained of. The sittings should be every day or every other day, and last from fifteen to thirty minutes. The alterative

effect is exerted not only on the mucous membrane, but on the whole uterus, and is accompanied by a very grateful soothing influence on the nerves. I have greatly benefited inveterate cases of areolar hyperplasia with the distressing neuroses recently referred to by a persistent use of galvanism thus applied. I have recently had a most excellent result in a case of hemicrania (migraine) and sciatica in which the attacks came on weekly or oftener, and were particularly severe at the menstrual period, rendering the lady a confirmed invalid and unable to take part in any social enjoyment. Examination revealed a complete laceration of the cervix (of eighteen years' standing) with cicatrization of the everted surface, and a very sensitive, hard nodule of plastic exudation extending from the right angle of the laceration into the cellular tissue. Pressure on this spot produced intense sciatica. Vaginal, and later intra-uterine galvanization, three to six sittings a week, the negative pole in the vagina, brought about a complete cure of the neuralgia, an absolute cessation of the vomiting, and a disappearance of the local exudation.

I have also seen decided benefit from mild intra-uterine galvanization in neuralgic dysmenorrhea which had resisted dilatation and all other topical measures.

Stimulants.—The stimulating effect of carbolic acid and electricity on the uterus is entirely a local one. It is intended to excite the growth of the uterus or produce a flow of blood from it by irritating the organ; and anything that accomplishes this object is indicated precisely in proportion to the effect it produces, and the absence of dangerous reaction. Thus the frequent introduction of the sound, the dilatation of the cervical canal by sponge-tents introduced at intervals of one to four weeks, the stimulus of sexual intercourse, will in time arouse the uterus to an increase of size. For the development of the ovaries particularly, the interrupted current is most effectual, applied as above described. This treatment should be continued for months or years.

Narcotics.—It does not frequently happen that any of the narcotic agents above enumerated require to be introduced into the uterine cavity. If so, they are generally employed in combination with some agent which is likely to give pain, such as tannin, ergot, carbolic acid. The narcotic is then generally added to a suppository or bougie of cocoa-butter or gelatine. The most useful narcotic for this purpose (if it can be so called) is iodoform. A solution of hydrochlorate of cocaine introduced on an applicator has recently been employed as a local anesthetic, but the expense of the drug interferes with its use in gynecological practice.

Disinfectants are seldom used in the undilated uterine cavity, for the reason that the necessity for them is not met with except in case of decomposing tumors, or after operations for the removal of such, or after miscarriage or labor at term. In all these cases the cervical canal is either spontaneously patulous, or has been widely dilated by artificial means. The disinfectant is then introduced in more or less diluted solution (as stated under Vaginal Injections) by means of the same injection-apparatus, especial care being taken that the fluid escapes as rapidly as it

enters. The patient should lie with hips not higher than the shoulders, the stream should be thrown in from a fountain syringe, and the nozzle of the syringe be devoid of a central aperture. If these precautions are observed, no danger need be anticipated from such injections. Their use, of course, will be indicated so long as the condition which called for them —the presence of decomposing matter in the uterine cavity—exists.

Oxytocics.—The only medicinal agent which is introduced into the uterine cavity for the purpose of producing contractions of that organ is ergot. It has been used by Emmet and others with the object of promoting the extrusion and expulsion of submucous or polypoid fibrous tumors of the uterus, being applied in the form of suppositories of cocoa-butter containing ten or fifteen grains of Squibb's aqueous extract of ergot, and has been found very efficient in this manner. I believe, however, that the same object can be attained quite as effectually and with less inconvenience to patient and physician by rectal suppositories of the same, or slightly less, amount. The faradic current may also be employed as an oxytocic. To many of the agents mentioned, chiefly tincture of iodine, persulphate and perchloride of iron, tannin, pinus Canadensis, the addition of glycerine in equal parts, or less amount if it is not desired to dilute the application so much, is very beneficial. The firm coagula produced by the iron solutions, for instance, are prevented by the glycerine, and their accumulation in the uterine cavity is thus avoided.

The agents most in use in ordinary intra-uterine medication (for chronic endometritis, metrorrhagia, subinvolution, atrophy, etc.) are the tincture of iodine (simple and compound), pure and impure carbolic acid, solution of nitrate of silver, nitric acid. The first three, either pure or mixed with glycerine, are almost the only ones used by me.

The time and frequency of making intra-uterine applications depends entirely upon the indication. In serious cases, of course, no time should be lost, and alarming or long-existing hemorrhage or malignant disease should be attacked at once by the remedy appropriate to the case. Many a time have I applied the tincture of iodine to a bleeding endometrium, feeling that the first indication was to arrest the hemorrhage, and have then, at my leisure, removed its cause.

As a rule, intra-uterine applications should be made in the intermenstrual period, the nearer the last period (*i.e.*, the more impressible the endometrium after the superficial exfoliation of its epithelium) the better. Thus, alterative applications are most effective soon *after* the period. Stimulant applications, however, which are made to bring on the menstrual flow, meet with the best results if made immediately *before* the expected appearance of that phenomenon. Also, when an immediate styptic effect is desired, *i.e.*, when the intention is to diminish an expected menstrual flow, a styptic application immediately before the period is indicated. On the other hand, styptic, astringent, caustic, and stimulant agents are in order after the flow when a lasting impression is desired. The frequency of intra-uterine applications must be regulated by the severity of the disease and the tolerance of the patient. Some patients will

easily stand three applications a week, others react severely on one. It is, therefore, always wise to begin with a mild application until the sensitiveness of that particular patient has been ascertained.

Caustics should, as a rule, be repeated not oftener than once a week; the strong agents not until the slough has disappeared, and then only if the pathological condition appears so little improved as to decidedly call for a fresh cauterization.

Astringents will probably need to be applied at least twice a week. Styptics only as often as the hemorrhage returns; or if it continues, every day until it ceases. Alteratives generally twice a week. Stimulants the same, or oftener. Of narcotics and disinfectants it is only necessary to say that their application is usually but temporary, and depends entirely on momentary indications.

The sole oxytocic, ergot, will be used in utero only so long as it either produces the desired result or shows its inefficiency, probably not longer than a few days.

The *strength* of intra-uterine applications has already been referred to in discussing the various agents. It is impossible to make fixed rules as to the strength of an application for each individual case. General directions having been given, the practitioner must learn by experience how strong solutions or combinations a patient needs or can bear. The rule to begin with milder applications and to gradually increase their strength as the endurance of the patient becomes known has already been pointed out. As a disease improves, the applications should be made less and less frequently, and their strength be gradually reduced, or the agent changed for a milder one, until the disease is entirely cured.

Conditions Necessary for Intra-uterine Applications.

An *indispensable condition* to the proper application of medicinal agents to the uterine cavity is that the cervical canal and its upper and lower orifice be sufficiently patent to permit the easy passage of the instrument carrying the remedy. A uterine canal which permits the free passage of the Simpson sound will usually, unless very tortuous or rugous (flexions, endotrachelitis), admit any of the ordinary applicators wrapped with a thin film of cotton. Other methods of application (hereafter to be described in detail) will require preparatory dilatation in proportion to the method. The more thorough the application is to be and the more powerful the agent, the more sloughing and discharge is likely to follow it, and the larger must the cervical canal be, in order that the sound parts be not touched when the application is made and there be no obstruction to the discharge. When frequent applications are required, when a powerful caustic like nitric acid, iodized phenol, or chromic acid is to be used (as is often the case in hyperplastic or villous endometritis, and always in malignant disease) the cervical canal should be previously dilated by artificial means. A sponge, laminaria, or tupelo-tent will accomplish this within twelve hours. It should be remembered, however, that in a very large pro-

portion of the cases in which intra-uterine applications are required (endometritis, metrorrhagia) the constant flow of either mucus or blood in itself dilates the canal and renders it patulous, and that therefore artificial dilatation may often be dispensed with.

When disinfectant applications to the endometrium are required the conditions which call for them (sloughing or removal of fibroids, or malignant growths) will also have produced a sufficient dilatation, so that the fluid, which in these cases is best introduced by injection, can readily enter and escape.

A precaution to be observed with all applications to the endometrium is to prevent the agent from escaping from the external os and burning the vagina and perhaps the vulva. This is likely to occur as well with solid agents, which melt, as with originally fluid remedies. It can be prevented by placing a tampon over the os, or plugging the cervical canal with cotton.

Other special conditions and precautions will be referred to under each separate method.

Methods of Making Intra-uterine Applications.

Medicinal agents may be introduced into the uterine cavity by various methods and in numerous forms. The following list comprises all in present use, the most efficient and practical being named first:

1. On applicators (probe-shaped rods) wrapped with cotton.
2. Through an applicator syringe.
3. By injection.
4. In soluble tents or bougies.
5. As ointments (with fluids and powders).
6. On a caustic-holder.

The nature of the application indicates that, by Methods 1, 2, and 3, only fluids can be introduced; by the other methods, solids and powders. I might have divided the applications into those of fluids, and those of solid agents; but thought it would be more practical to classify the methods according to their efficiency, since some of the agents (iodine, nitrate of silver) are applied both in the solid form (in tents and stick) and in solution.

1. *On Applicators.*—The application of fluids to the endometrium differs in execution and facility accordingly as the cervical canal has its normal dimensions, or has been dilated by natural or artificial means.

a. *Through the Undilated Cervical Canal.*—The instruments employed to carry fluids into the uterine cavity are sound- or probe-shaped rods of metal or hard rubber. The vehicle containing the fluid is cotton, preferably absorbent cotton, which is wound about the uterine end of the applicator, at a thickness adequate to absorb sufficient fluid, and still

not to interfere with the passage of the applicator. Applicators are either flat or round, and if the latter, gently tapering to the point. The metal applicators are made of silver, aluminium, platinum, even gold, for the *praxis aurea*, or of copper, nickel-plated, for hospital use. The objection to the plated applicators is that they require frequent replating, and are very easily twisted and ruined, but their cheapness fully counterbalances this advantage. A greater objection, in my mind, to all soft metal applicators is their extreme flexibility, which in a but slightly patent or rugous canal results in their bending at every obstruction, and interfering with introduction. Mere curvature of the canal is no obstacle, since the applicator can, and should, be bent to conform to the previously ascertained curve. Inflexible metal applicators are not in use in this country, hard rubber having taken their place. I, for my part, prefer applicators made of hard rubber, shaped liked Simpson's sound, but much thinner, perfectly smooth, and almost in-elastic. Some of these applicators are made with a bulbous tip, but I decidedly object to this, as it renders the removal of the moist cotton after the application a difficult matter. A very good hard-rubber applicator with flat uterine portion is made by Shepard & Dudley, of New York. A straight, tapering, and exceedingly elastic rubber applicator, sold by many instrument-makers, does not meet with my approval, as it twists and bends at every angle or rugosity of the uterine canal, and is exceedingly difficult of introduction, except in a widely patent passage. In some applicators the uterine two and one-half inches are slightly roughened, so as to retain the cotton. This is not at all necessary, and occasions decided annoyance when the moist cotton is to be removed. The flexible metal applicators first recommended by Emmet, and sold under his name, had a wire-spring slide for the purpose of slipping off the cotton. But this slide interferes with the handling of the instrument, and, if the cotton is properly wrapped, is not needed.

A certain knack is required to wrap an applicator properly with cotton, so that the cotton envelope will not be too thick, nor too tightly wound, or so loosely as to be slid up from the point when the applicator is passed through the internal os (the narrow spot of the canal), or be left in the cavity when the applicator is withdrawn. The physician should practise wrapping his applicators until he has acquired the necessary skill, as a trained nurse may not always be at hand. The applicator is seized in the right hand, its end moistened, and a *thin* film of absorbent cotton, about three inches long by two inches wide, is laid on the palmar surface of the four fingers of the left hand; the applicator is then seized between the thumb and first two fingers of the right hand, and placed lengthwise on the film of cotton, close to its left border. By then rotating the applicator with the right hand, the cotton is twisted around its uterine end, and evenly and smoothly arranged by the thumb and first two fingers of the left hand. Care should be taken not to let the twisted cotton project beyond the end of the applicator, else this loose bit will double over and prevent the passage of the instrument. The end of the applicator should be smoothly and tightly covered, so that there is no danger of the

bare point being pushed through it, and the cotton slipped up the applicator as its tip passes the internal os. If this should occur, and force were used, under the impression that the length of cotton-covering still outside of the external os shows that the point has not reached the fundus, it is evident that the uterus might be seriously injured. It is well to wrap not less than two and a half, and not more than three inches of the tip of the applicator with cotton, in order to be able to see, by the end of the cotton being at the external os, that the fundus has been reached, and also to be able to seize the projecting bit of cotton with the forceps, in case it should chance to be left behind in the uterus. The fundus will, of course, also be recognized by the touch.

The cotton should be wrapped so tightly, especially near the tip, that it will not slip and become wrinkled as it is passed through the cervical canal; and again not so tightly that it cannot absorb readily and be easily slipped off after its withdrawal from the uterus. If a flat metal applicator is used the uterine end should be dipped in oil or vaseline before wrapping it, which will greatly facilitate the removal of the cotton. This is readily done by seizing it between the blades of the dressing-forceps and slipping it off, care being taken to grasp the cotton-wrapped portion at least near its middle in order not to push the cotton all together in a ball, when its removal will be very difficult. The cotton wrapping should correspond in thickness to the size of the uterine canal. In the undilated state, no more than a thin film of cotton can be passed.

FIG. 107.—Hard-rubber Applicator used by P. F. M.

Manner of Using the Applicator.—It is almost needless to say that the application must be made through a speculum. If the cervical canal is normally patent and there is no tortuosity or flexion, a large cylindrical or plurivalve will answer, precisely as for the passage of the sound. But an application is more difficult in that the cotton film, no matter how smoothly rolled, will be likely to catch in the cervical canal and the cervix be pushed back and the application fail. It is, therefore, generally necessary to steady the cervix, and draw down and straighten the uterus by a tenaculum hooked into its anterior lip. The direction and width of the uterine canal should have been ascertained before making the application by passing the sound after the speculum has been introduced. I prefer the sound to the probe, as it gives a better indication of the width of the canal. If the sound cannot be passed through the round or valvular speculum, it is evident that an application will fail; and the Sims speculum should be at once inserted in the position and according to the rules already described.

The following *rules* apply to an application through any speculum: The cervix having been exposed, the anterior lip is seized with a tenaculum, the uterus gently drawn down and straightened, and the sound passed to

the fundus. The direction and width of the uterine canal thus ascertained should be carefully remembered, as it is exceedingly awkward to find the point of the applicator arrested at some spot within the canal, and the fluid expressed in futile attempts to reach the fundus. The operator then seizes an applicator (of which several should be at hand wrapped with cotton) and passes it dry to the fundus in order to absorb and remove the uterine secretions, or any blood which may have escaped since the sounding. If the oozing (chiefly of blood) is rapid, it is well to leave one applicator in the uterus to absorb it until the medicated rod can be prepared and introduced. If the secretion is very thick and tenacious, it should be removed with the uterine syringe, or an applicator dipped in a solution of bichromate of potash (1 : 8) or pure carbolic acid may succeed in detaching it. Several applicators may thus need to be passed before the canal is clear and dry.

This removal of tenacious cervical mucus is often exceedingly difficult, and various devices have been adopted by different gynecologists to effect this purpose. Dr. Thomas prefers conical bits of dry sponge passed into the cervix on a dressing-forceps; Dr. Lusk uses an instrument like a double blunt wire curette, introduced from England; others succeed with an applicator wrapped with absorbent cotton; I often find it necessary to empty the follicles by scraping the cervical cavity with Thomas' blunt curette before I can clear the passage of its secretions. An absolute cleansing of the cervical and uterine cavities is necessary to the effectual application of remedies.

In moistening the applicator in the fluid, care should be taken not to saturate it too profusely, or the greater part of the fluid will be squeezed out and flow on the vagina before the uterine cavity is reached. The bottle containing the agent should be placed conveniently at the right hand, the soaked applicator standing in it ready for the hand of the operator. The uterine cavity having been mopped out, the dry applicator is quickly removed and dropped into the basin, and the medicated applicator seized and passed rapidly in the ascertanied direction to the fundus. If there is any obstacle to its immediate passage, that attempt may be put down as a failure, since the irritation of the internal os by the agent results in its contraction and closure to the point of the applicator. The latter may then as well be withdrawn, and the attempt repeated after a short interval. If the canal is not very pervious and the agent is particularly irritant or caustic (like pure carbolic acid or iodized phenol) it may be advisable to protect the cervix and vagina by placing a layer of cotton underneath it.

The applicator, having been safely passed to the fundus, may be allowed to remain a few moments, especially if it be soaked in iodine with a hemostatic purpose; or, if an irritant or caustic effect is desired, it may be drawn back and forth several times and then removed. If it is grasped by the uterus, no force should be used, for in a few moments the contraction will cease, and the applicator is then easily withdrawn. If a very decided effect is intended, or if hemorrhage still continues, the application may be

repeated with a fresh applicator. When the applicator has been withdrawn, the tenaculum is detached, all excess of fluid is mopped up, the vagina dried, and a flat tampon soaked in glycerine having been placed over the cervix, the speculum is removed.

b. *Through the Dilated Cervical Canal.*—The canal may be dilated either as a result of the condition which calls for the application (endometritis, metrorrhagia), or it may not have contracted after a shortly preceding miscarriage or labor, or it may be naturally patulous on account of many labors and subinvolution, or finally, it may have been dilated by artificial means. It is self-evident that the more pervious and the wider the uterine canal the easier the introduction of sound or applicator. When a very thorough application is intended, and every portion of the endometrium is to be touched, it is advisable to dilate the uterus before making the application. It is not always necessary to do this with slowly dilating measures (tents), but rapid forcible dilatation may suffice. I frequently introduce the two-bladed steel dilator shown in Fig. 120, and stretch the whole cervical canal with its two orifices to the width of half an inch, and then find a previously impossible or difficult application an easy matter. Or I introduce the applicator into the uterine canal between the branches of the dilator when they are separated.

Fig. 108.—Sims' Hard-Rubber Slide Applicator, Plain.

Fig. 109.—Sims' Slide Applicator Wrapped with Cotton for Saturation, and to be Left in the Uterine Cavity (P. F. M.).

When the uterine canal is moderately dilated, I either use the stiff whalebone applicator, above described, wrapping more cotton about it, or I employ the thicker applicator with a slide introduced by Sims. This applicator is stiffer than the one already recommended, and the most convenient instrument when a thorough application is to be made. When a more permanent effect is desired, I slide the cotton off (the left hand pressing the slide against the cervix while the other withdraws the rod), and leave it in the uterine cavity for twenty-four or forty-eight hours. I then either remove it myself or let the patient do so by a thread attached to it.

This maneuvre is specially useful in case of hemorrhage, when the strong tincture of iodine or the solution of the persulphate of iron and glycerine are the articles used as a styptic. In subinvolution and areolar hyperplasia a more decided stimulant and absorbent effect may be thus obtained. In hemorrhage the cotton itself acts as an intra-uterine tampon. If not removed, the cotton will in two or three days become loosened in the uterine cavity, there will be a somewhat offensive discharge, and the cotton will either be washed out by this discharge or be expelled by uterine contractions. Occasionally, however, the retained cotton will produce so much irritation, local (hemorrhage) and constitutional (febrile reaction), as to require immediate removal as soon as these symptoms present themselves. While it may be beneficial in hemorrhage and diffuse hyperplastic endometritis to allow the cotton to slough away, it is generally advisable to attach a stout thread to the plug (as seen in the diagram) by which the patient herself can remove it whenever necessary. In no case should the plug be allowed to remain in the uterine cavity longer than three days. Even this period would be inadmissible did not the iodine in which the plug was soaked prevent its early decomposition. When the uterine canal is widely pervious, as after labor or miscarriage, or dilatation by tents, I generally make the application by means of the ordinary straight whalebone or hard-rubber screw-stick (see Fig. 87), the screw end of which

Fig. 110.—Straight Slide Applicator (P. F. M.). The cotton plug in this cut should be much longer.

is wrapped tightly with as large a roll of cotton as will pass soaked in the agent, and the cervix being steadied with the tenaculum, is passed straight to the fundus and twisted about there until the whole cavity is thoroughly mopped. I have thus frequently applied iodine, carbolic acid, iodized phenol, and even pure nitric acid. If the external os is sufficiently patulous and its lips are separated by the tenaculum, very little fluid will touch the outer portion of the cervix and escape into the vagina. Of course, the usual precautions of first mopping out the cavity and protecting the vagina with cotton should be observed, and an excess of fluid should be squeezed out of the cotton. The glycerine tampon is of course placed over the cervix.

When I wish to leave a larger plug of cotton in such a well-dilated uterus, as a tampon chiefly, I use such a straight hard-rubber stick with a metal slide, but smooth all its length, so as to slide the cotton off easily.

When an application of so powerful an agent as nitric acid is made to the endometrium it is done because a milder remedy is not thought sufficient; the effect desired is, therefore, as thorough a one as is consistent with safety. The conditions in which nitric acid is employed are chiefly polypoid vegetations of the endometrium (endometritis villosa, polyposa, hyperplastica, hemorrhagica), the main symptom of which is hemorrhage, malignant degeneration (sarcoma) of the uterine mucosa; and membranous dysmenorrhea, in the latter of which it is desired to destroy the mu-

cous membrane down to the muscular coat, and substitute cicatricial tissue, or at least remove so much of the hyperplastic membrane as to insure the growth of a new, presumably more healthy, coat. The acid must therefore be employed *thoroughly*, and no fear need be entertained that an excess will create too deep an eschar. It is not diffusible like caustic potash, and rapidly produces an albuminate with the tissues which prevents it from entering deeper than to a certain limited extent into the mucous membrane. The shock and reaction from nitric acid applied to the endometrium, when used in this manner through a widely dilated cervical canal from which the slough and secretions can readily escape, is no greater than after iodine or carbolic acid; and the benefit, in the proper cases, is most decided.

The *advantages* of these applications on cotton-wrapped applicators are the ease, rapidity, painlessness, with which they are performed, and the absence of the necessity for previous dilatation of the uterine canal.

The *disadvantages*, however, are quite sufficient to induce us to seek other and better means. These disadvantages may really be summed up in one word—inefficiency. In the cases where a widely dilated cervical canal permits the easy, unhindered introduction of a large cotton swab, the application can be made thoroughly, and the result will be proportionately rapid and good. But when the canal is narrow—that is, when it has the normal width and merely admits the sound—it is unavoidable that by far the largest portion of the fluid in which the applicator was dipped must be pressed out and trickle out of the os, and what little reaches the uterine cavity proper is so neutralized by its contact with the secretions of the cervix as to be almost inert. In the vast majority of cases with normal cervical canals, I really believe that the effect of the agent is expended entirely on the mucous lining of the cervical canal, and that the endometrium proper is touched merely by the albuminous coating of the applicator. Where an irritant effect is desired, this may be of little consequence, for the applicator itself drawn back and forth irritates the endometrium; but when a decidedly caustic or astringent influence is intended, the result generally fails to meet the expectations.

To remedy this objection various contrivances have been proposed by which it was designed to protect the cervical canal from the remedy, as well as the remedy from the cervical canal, and keep the applicator free until it had passed the internal os. The manner of accomplishing this was by means of a tube which was introduced into the cervical canal up to or through the internal os, and through which the applicator (or stylet, as it is then called) is passed. Such devices are those of Wylie, of New York, Lombe Atthill, of Dublin, Woodbury, of Washington, D. C., Peaslee, and numerous others.

These canulæ, or cervical specula, are made of metal (silver or platinum), hard rubber, or glass (Woodbury's). They are introduced into the cervical canal up to (and should be through) the internal os; the cotton-wrapped stylet, which has been soaked in the agent and withdrawn into the canula, is then pushed forward until it touches the fundus. Or

the canula may have been inserted alone, and the stylet is then thrust through it. Canula and stylet are then removed together.

The principle of these instruments is very good, but, as with many other contrivances, is not confirmed by practice. If the cervical canal and internal os are sufficiently patulous, no doubt the canula can easily be passed through the latter, and will answer its purpose perfectly. But in these cases we can, perhaps, succeed quite as well without the canula, although doubtless all contact with the cervix is obviated by it. But in the very class of cases in which such a protector is most needed, in the normal cervical canal with narrow internal orifice, perhaps with an angle of flexion at that spot, the cervical protector is too large to pass through or even to the internal os. To be of any service the canula must have at least the diameter of one-eighth of an inch inside measurement, and this is precisely the diameter of the bulb at the tip of Simpson's sound. Now take the thickness of the walls of the canula, and add a little lee-way for the stylet to play, and we have a canula of at least one-fourth inch diameter, which is the least size through which a cotton-wrapped stylet can be thrust without expressing the fluid. And a normal internal os seldom measures one-fourth inch in diameter. Besides, the sharp border of the canula catches at the internal os and can be introduced no farther. Unless the canula passes the internal os, the stylet will almost inevitably catch at that spot, and the application prove a failure. I speak from an extended experience in making this criticism on these applicators with cervical protectors, and much prefer to make an application between the expanded branches of a steel dilator.

When the cervical canal is dilated, however, and the canula can pass the internal os it is a great convenience. And I notice that the inventors of these instruments speak of their employment in precisely such cases. For the application of nitric acid, they are then particularly useful, and Atthill employs his applicator almost entirely for this agent. Before applying nitric acid or iodized phenol to the endometrium, I should always dilate the cervical canal thoroughly and consider the whole procedure in the light of an operation; the gravity of the diseases requiring such powerful remedies certainly justifies that precaution. An ordinary glass tube, with an inside diameter of half an inch, will then answer every purpose, and it need not even be curved when the cervical canal is so widely dilated.

A cheap and, compared with the instruments above described, equally efficient contrivance is that of an ordinary No. 12 elastic catheter, with the end cut off square; the mandrin is then used precisely like the stylet in the other applicators. I believe it was devised by Dr. James R. Chadwick, of Boston. If it were safe to *inject* fluid into the undilated cavity of the uterus, this would be a very easy way out of the dilemma. But, as I shall explain in detail, hereafter, intra-uterine injections, even with all proper precautions, are so dangerous as to have been almost abandoned by the profession. With the view of combining the efficiency of injections with the safety of applications, several gynecologists have hit upon a plan, which I shall now describe under the name of the

2. *Applicator-syringe.*—Several years ago, having by experience become fully alive to the objections against the ordinary uterine applications, I chanced to meet with Buttles' uterine syringe, and it occurred to me that a very good way to avoid the expression and albumination of the fluid in the cervical canal would be to first fill the syringe with the application fluid, then wrap absorbent cotton about the uterine portion (precisely as described for the applicator), introduce it, and gently express the fluid. The dry cotton having thus been introduced into the uterine cavity, the slow expression of the fluid would gradually saturate the cotton, and the

FIG. 111.—Applicator-syringe (P. F. M.).

agent thus in its undiluted condition come in contact with the endometrium. I at once put this idea into execution, and found that it answered perfectly ; the very slender nozzle of the syringe (which is of hard rubber and holds about one-half a drachm of fluid) when wrapped by a thin film of cotton, presented no obstacle to its introduction through almost any normal cervical canal ; the thin film of cotton allowed the fluid to ooze through it gradually (as can be seen on trying the experiment outside of the body), and the shock of the rapid injection of fluid was thus avoided. Nothing but the usual slight sensation of warmth in the hypogastric region, occasionally moderate pain, was experienced. As soon as the cotton was saturated, the fluid escaped from the external os ; and this was a sign to cease the injection. I made the application usually through a Sims speculum, but frequently through a large cylindrical or bivalve, and found no difficulty in passing the slender cotton-wrapped syringe tip to the fundus uteri. Only in three or four instances did I witness more than the

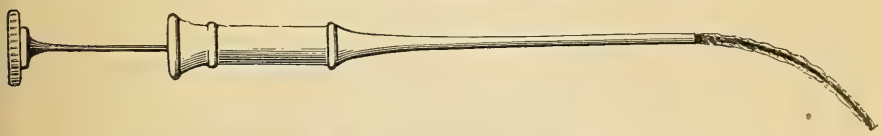


FIG. 112.—Applicator-syringe, Filled and Wrapped with Cotton, Ready for Use (P. F. M.).

above-mentioned slight hypogastric pain. I have applied through this syringe only the tincture of iodine (simple and compound), the pure and impure carbolic acid, the nitrate of silver (℥ j. to ℥ j.), and pure nitric acid. Each of these, the nitric acid, the impure carbolic, the silver-nitrate solution, and the tincture of iodine produced a decided constitutional shock in one instance, which required the hypodermic use of morphine, alcoholic stimulants, and a rest of several hours. No further unpleasant consequences ensued.

In order, however, to avoid even this rare shock, I adopted the plan of

propelling the piston of the syringe merely by turning it, as one does a screw, and withdrawing it as soon as I noticed fluid escaping from the external os. In this manner any sudden forcing of the fluid through the cotton into the uterine cavity was avoided, and an excess at once relieved. I have employed this method many hundreds of times, and am convinced that it is the most efficient, convenient, and safe method of making intra-uterine applications. Even the application of nitric acid, which was only once followed by shock, was performed through an undilated uterine canal. Had previous dilatation been practised, I am confident no reaction would have occurred, and subsequent experience confirms this view.

After I had used this method for all cases in which the cervical canal was not sufficiently patulous to permit the unobstructed passage of the applicator, I heard accidentally that Drs. Lawson and Lente, of New York, had proposed a similar device several years previously. On looking the matter up, I found that these gentlemen had recommended the ordinary hypodermic syringe with a long flexible uterine tube of silver for the same purpose. The advantage of these silver tubes is that they can be bent to conform to the curve of the uterine canal; but the objection to them is that they are more likely to become clogged by the corrosion of the metal from the nitric acid or iodine, which are among the principal agents used for intra-uterine applications. The nitrate of silver will of course tarnish pure silver if the solution is at all strong.

In all these applicator-syringes the final two and a half inches of the uterine end of the tube are made very slender (the uterine portion of Buttles' hard-rubber syringe is a fine piece of workmanship), and are perforated with numerous small holes. The expansion of the tube two and a half inches from the tip shows the limit of the normal uterine canal. This application may be made without a speculum, the syringe being introduced like the sound on the finger; but the oozing of fluid from the os requires a tampon, which cannot readily be placed without a speculum.

Care should be taken to wrap the cotton sufficiently tight about the syringe, or it may be left in the uterine cavity when the nozzle is withdrawn. But it should not be wrapped so tightly as to interfere with its proper saturation with fluid from the syringe. If the cotton should slip from the nozzle and remain in the uterine cavity, the dressing-forceps should be introduced and the cotton plug sought for until found and withdrawn. If particular difficulty is experienced in accomplishing this, it may be preferable to leave the expulsion of the cotton to the uterus, which will generally contract upon and express it in a few days. Or it will be washed out by the ordinary uterine discharge. Should it not be noticed in the secretions, or in the water escaping during the usual vaginal injections, the patient having been instructed to watch for it, a fresh attempt may be made to remove it with forceps, or the uterus may be rapidly dilated with steel-branched dilators, and the cotton removed. Obviously, it would be unsafe to allow a foreign body of the putrescent tendency of cotton to remain in the uterine cavity for an indefinite period; besides the risk of septic infection, a hemorrhage would be excited by it sooner or later.

Tamponade of the uterine cavity, already briefly referred to. From the description of the use and objects of the Sims slide-applicator, it is quite evident that the cotton slipped off from it, and left in the uterine cavity, will act not only by its medicinal ingredients, but also by direct pressure on the endometrium. The plug thus introduced, therefore, acts as a styptic, which is the object desired in tamponing the uterine cavity. If, therefore, a woman is bleeding from her uterus, the latter is not at all, or but moderately, dilated, and it is desired to arrest the hemorrhage at once and with absolute certainty, the very best means to accomplish this is to introduce as large a cotton plug as possible up to the fundus on a Sims slide-applicator, slip it off, and leave it in the uterus for twenty-four hours or longer. The effect of the tampon is greatly increased by saturating it in strong tincture of iodine as described, which besides guards it from decomposition, or a solution of persulphate of iron and glycerine, equal parts, will be found serviceable. This, then, is the simplest, quickest, and most efficient method of arresting uterine hemorrhage by tamponing the cavity of the organ. A vaginal tampon applied through a Sims speculum (as described under Tampons) should generally be introduced, and both these applications repeated in twenty-four to forty-eight hours. The vaginal tampon may be renewed in twenty-four hours, the uterine not until forty-

FIG. 113.—Slide-applicator, Wrapped with Thick Cotton Plug, for Tamponade of Uterus (P. F. M.).

eight hours or longer, if the hemorrhage has not returned. It can be removed by the string attached (see Fig. 113), or it may have been left so long as to project from the external os, and be easily removable by forceps. It may not require repetition if the hemorrhage has ceased. It is advisable to combine the influence of rest and internal hemostatics with the local measures, in order to remove the cause of the flow and prevent its repetition.

When the uterine canal is widely dilated, as after removal of a fibroid polypus or submucous or interstitial fibroid, or occasionally for persistent hemorrhage after abortion, the uterine cavity is tamponed more after the manner described for the vagina, viz., by passing small flat pledgets, or little balls of cotton, soaked in carbolized alum, or weak chloride of zinc solution, and squeezed dry, into the cavity with long forceps, and packing them tight until the cavity is filled; a vaginal tampon then keeps the uterine column in place. The uterine pledgets are removed, by screwing the tampon-extractor into the cotton, and removing them one by one. Both the introduction and removal of the tampons are best performed through Sims' speculum.

3. *Injection.*—I shall not devote much space to the discussion of the injection of fluids into the undilated uterine cavity, for the reason that I think they are not to be recommended. Many articles have been written

on the subject, the majority of the writers agreeing that uterine injections are an efficient remedy in catarrhal and hemorrhagic conditions of the endometrium, but accompanied by a degree of danger which should lead us to be extremely cautious in using them. The late Dr. J. C. Nott, of New York, was one of the last to write an elaborate and widely quoted article on the subject, in which he maintained that intra-uterine injections are safe and justifiable if the uterine canal is thoroughly dilated and there is no obstruction to the free escape of the injection fluid, and subsequent secretions. This is at present the opinion of the large majority of careful gynecologists all over the world; but it is safe to say that, the uterine cavity having been once thoroughly dilated, it is still less dangerous, while quite as efficient, to mop it out with an impregnated cotton swab (such as the screw-stick repeatedly spoken of).

The dangers from intra-uterine injections do not lie so much in the strength or nature of the chemical agents used, although of course the more powerful the agent, the stronger its local and general impression; but rather in the shock imparted to the nervous system by the sudden dilatation of the uterine cavity by the injected fluid, in the danger of peritonitis from the uterine irritation, and finally in the possibility of the fluid passing through the Fallopian tubes into the peritoneal cavity, and there setting up a violent peritonitis. The two first accidents, shock and peritonitis, are the most likely to occur; but the entrance of fluid into the tubes has in several instances been verified at the autopsy. To prevent the shock and the passage of the tubes, the inevitable rule of previously dilating the uterine canal has been laid down, supposing that the ready escape of the fluid would prevent these accidents. Notwithstanding, several of the sixteen deaths which I find reported as having occurred in consequence of intra-uterine injections, took place after the necessity for this precaution was recognized, and under the hands of experienced and competent operators. Numerous cases of merely temporary shock, collapse, uterine colic, and of peritonitis, followed by recovery, which have doubtless occurred as a direct result of these injections, have not been reported, but their occurrence has doubtless led all cautious gynecologists to *limit intra-uterine injections, even with a dilated canal, to those cases in which ordinary applications failed, or the removal of intra-uterine tumors or an immature ovum required the cleansing of the widely dilated cavity by antiseptic irrigation.* In the latter class of cases I have frequently washed out the uterine cavity with both hot and cold water, propelled either by a Davidson or fountain syringe, and have never seen the slightest evil result therefrom. I have several times seen quite severe shock and uterine pain follow applications with the applicator-syringe, as just described, when the fluid was forced too rapidly through the cotton, so as almost to resemble an injection, and have no desire to repeat such an experiment. In any case where it is justifiable to run such a risk as an intra-uterine injection carries with it, it is certainly worth the while to dilate the cavity thoroughly and make the application by a swab. For the benefit of those cases in which repeated powerful applications fail (such as obstinate chronic endometritis,

and hemorrhage from flaccidity of the mucosa), and an excess of the agent seems called for, I will point out briefly the manner of injecting the uterine cavity: the width of the uterine canal being at least that of the little finger, the cervix is exposed through a large plurivalve speculum; the uterus drawn down and straightened by a tenaculum in the anterior lip, so as to efface any angle at the internal os. The syringe is then filled with the fluid (tincture of iodine, carbolic acid, iodized phenol, solution of the persulphate or perchloride of iron with equal parts of glycerine) and introduced to the fundus. Withdrawing it then about one-fourth of an inch, the fluid is *very gently and slowly* expressed, drop by drop, by turning the piston-screw, not pushing it, until from five to ten minims are expressed, according to the size of the cavity. This expression should occupy several minutes. The patient should be kept in bed, and under opium for at least twenty-four hours.

The syringe may be either that of Buttles or Lente, or if a larger tube is desired, that of Bumstead is a good instrument. Or the glass tube with rubber bulb of Woodbury or White may be used. Dr. Nott used a double-current catheter, through which he injected several ounces or more of medicated water, beginning with plain water to test the uterus. His catheter is almost identical with that of Skene for the bladder.

It is better to make all intra-uterine injections on the back, rather than in the semiprone position, because the escape of the fluid is facilitated in the dorsal position, and there is less likelihood of the fluid passing into the Fallopian tubes.

The frequency of strong intra-uterine injections will conform entirely to the necessities of the case and the general rules given under Applications.

A use of intra-uterine injections which cannot be classed under the same category as those treated of here, is for the cure of sterility by injecting a small quantity of fresh semen into the uterus. The same precautions should be observed as in therapeutic injections, so far as gentleness and slowness of expression of the fluid is concerned; but it is not customary to dilate the uterus beforehand. Still, if the canal were abnormally narrow, the injection even of semen would be quite as hazardous as of a chemical agent. For, even a few drops of pure water or glycerine have produced severe uterine colic. This method of artificial impregnation can scarcely be said to have established itself as a recognized practice.

4. *Medicated Tents or Bougies.*—With the view of avoiding the expression of the agent while it is passed through the cervical canal and of escaping the dangers inherent to uterine injections; with the object, therefore, of combining efficiency, safety, and ease of application, and of avoiding the tedious and always somewhat hazardous preliminary dilatation of the uterine canal, the device was adopted, years ago, of incorporating the medicines in some soluble but temporarily solid vehicle, to which a pencil-shape was given, and which was introduced into the uterine cavity and allowed to melt there. The vehicle may be either cocoa-butter, gum-tragacanth, gum-arabic, paraffine, or gelatine. Tannin powder is the only

substance which can be simply rubbed up with glycerine and rolled out to any thickness desired on a porcelain tablet; it hardens in the air, but does not readily dissolve in the uterine cavity. Cocoa-butter makes a very good vehicle for suppositories, but it is too fragile for pencils so thin as these for the uterus require to be, and it has, therefore, been abandoned for this purpose. Gum-tragacanth and gum-arabic powder make elegant, slender pencils, but they become so hard as to readily injure the endometrium and, what is quite as important, *quoad therapiam*, not to melt, and therefore prove inert. This last objection applies to paraffine, and until recently also to gelatine. But within the past few years experiments in the manufacture of gelatine bougies have been made by various chemists of New York and elsewhere, which have resulted in the production of an exceedingly efficient article. The best pencils are made by Joseph Fleischer, a druggist of New York, whom I have already mentioned when speaking of vaginal suppositories, Parke Davis & Co., of Detroit, and Charles L. Mitchell, of Philadelphia. To be efficient they must be and remain soft and perfectly flexible; if they are in the least degree hard they fail to melt in the uterus, and not only miss their purpose, but act as an irritant and excite uterine colic. A soft bougie is sure to be melted and absorbed within twelve hours, a hard, brittle bougie never. If they are to be kept any length of time and in a warm room, it is best to preserve them wrapped up in waxed paper or tinfoil, to prevent absorption of moisture; but some of my iodoform bougies, especially, have retained their flexibility for a year or more simply kept in a pasteboard box.

FIG. 114.—Tube for introducing medicated bougies into the uterus (P. F. M.).

These bougies may be inserted by pushing them into the uterine cavity through a speculum with the dressing-forceps. I have tried this, but found that the smooth pencils would slip out of the cervix as soon as the forceps were withdrawn, unless they were pushed beyond the internal os, which required the deep introduction of the forceps and often resulted in the removal of the tent with the forceps. I thought some kind of tube would be serviceable, and on inquiry at Mr. Schmidt's, the instrument-maker, found an instrument devised by Dr. Barker, for the introduction of ointment into the uterus which seemed to answer the purpose. I soon found that in order to introduce the tube and expel the tents with one hand I needed a hold on the handle of the tube for thumb and two fingers, and consequently had the instrument shown in Fig. 114 constructed, which answers the purpose admirably. The tube is of hard rubber, slightly bent to permit its easy passage to the internal os. The instrument can be introduced without a speculum, or through a large tubular, or bivalve, or a Sims speculum. I prefer to use it through a speculum in order to place a tampon over the os afterward. Before exposing the cervix through the Sims,

I place the bougie in the tube, push it forward toward the uterine end, and then, seizing the instrument in my right hand, with the thumb in the ring and the first two fingers grasping the tube at the broad flange, I insert the end of the tube into the cervical canal and push it forward as far as it will go. Holding it steadily in the cervical canal, I push forward the piston and do not withdraw the tube until the piston is pushed home. I can then be certain that the tent has been forced through the internal os into the uterine cavity. If I were to withdraw the tube as I push the piston forward, the tent would probably be but partially inserted. The length of the tent is made to correspond to that of the uterine cavity, and its pliability prevents injury to the endometrium. In order to prevent the dissolved tent from escaping from the external os and burning the vagina and vulva, and also to insure its full effect on the endometrium, I am in the habit of introducing a cotton plug into the cervix with Sims' slide-applicator. This the patient removes by the attached string on the following day, and then uses the common hot or cleansing vaginal injection. The tents are generally introduced in the office, and the patients allowed to go about their usual avocations. Usually one bougie suffices for each treatment; but if the uterine cavity is much dilated, or a particularly strong effect is desired, two may be inserted at the same sitting. To do this, both are passed into the tube at once, one after the other, and the first tent having been deposited in the uterine cavity, as seen by the length of piston still exposed, the point of the tube is turned slightly to one side, and the second tent placed beside the first.

I have introduced these pencils many times and have never seen more than very slight suprapubic burning follow. In no case was either the introduction or the after-result painful or productive of unpleasant consequences. Some of the gynecologists who have used them speak of uterine colic following them, but I have not seen it in my practice. The tents may be introduced every other day, or twice a week, as the case requires.

The remedies likely to be useful in the uterine cavity, the amount in each bougie, and the therapeutical action, are given in the following list. Other combinations are supplied by the manufacturers, but those given answer nearly every purpose.

Iodine, gr. v. to x. } alterative.
Iodine comp., gr. v. to x. } absorbent.
Iodine, and carbolic acid, āā gr. v.—alterative and caustic.
Iodoform, gr. v. to x.—alterative and anesthetic.
Iodoform and tannin, gr. v. gr. iij. }
Iodoform and alum, āā gr. v. } alterative and astringent.
Sulph. zinc and iodoform, āā gr. v. }
Sulphate zinc, gr. v. to x. }
Hydrastis Canadensis, gr. x. } astringent.
Chloride zinc, gr. ss. to j. }

Of the tents contained in the list I have used only those containing iodine, iodoform, carbolic acid, alum, sulphate of zinc, hydrastis Canadensis, and the combinations of two or more of these drugs. Those of iodine,

iodine and carbolic acid, iodoform, and iodoform and alum, I have found most serviceable. Narcotic agents are omitted from the list, as they act better per rectum.

As regards the efficiency of these medicated tents, I think that for a gradual effect, an effect produced to a certain degree, by absorption of their ingredients, they excel fluid applications. For a direct styptic effect, however, they are far inferior to the uterine plug soaked in tincture of iodine and left in utero. Therefore, when a rapid, sharp effect, either for hemostasis or with an irritant object, is intended, the introduction of fluids on cotton-wrapped applicators is preferable. For subinvolution, hyperplasia, and chronic endometritis the tents are superior.

For many years it was the custom here and abroad to introduce the solid stick of nitrate of silver, or of equal parts of nitrate of silver and nitrate of potash, into the uterine cavity and drop it there to melt at its own leisure. I have seen many such sticks of the nitrate pushed into the uterus with the "uterine pistol" (an instrument resembling my bougie-tube) for endometritis or "chronic metritis" in Braun's clinic in Vienna, and as many women writhing and groaning with uterine colic for an hour or more afterward. It probably was efficient treatment—it certainly was painful enough to do good; but I think it was rather too dangerous to be justifiable as a routine practice. I have already expressed my opinion of the solid nitrate of silver as an application to the uterus, and am glad to say that with us it is no longer practised. Solid sticks of the sulphates of copper and zinc, fused and cast in thin moulds, have been introduced in the same manner; but I, for my part, am afraid of these strong applications in solid form. They may cure, but they may also kill.

The introduction of fluid medicines into the uterine cavity contained in gelatine capsules has been recommended by Sale and others, who pushed the capsules beyond the internal os with forceps. Powdered iodoform can also be inserted into the uterus in this way. I do not believe that this recommendation has been generally followed, although I think the plan a good one, especially if the capsules can be introduced by means of a piston-tube.

Sponge-tents have also been impregnated with drugs in solution (chiefly carbolic acid, zinc, and copper solutions) which, of course, exerted their local or general effect when the sponge became permeated with fluid from the tissues of the uterus. I have frequently used carbolic acid in this way, dipping the tent into the acid immediately before inserting it; indeed, all sponge-tents now made are carbolized.

5. *Ointments.*—Any of the drugs used for intra-uterine medication, which permit of being rubbed up with lard or vaseline, can be applied to the endometrium through a wide-mouthed syringe or piston-tube. Such instruments have been devised by Barker, Barnes, Lente, and others, and the method is well spoken of by these gentlemen. It seems to be especially applicable to those cases in which a gradual action and absorption of the agent is desired. For caustic styptic and stimulant effects this

method is evidently not appropriate, as the dilution of the agent by the vehicle softens its action. Thus, the iodine compounds, mercurial ointment, nitrate of silver would do good service in hyperplasia and endometritis, if applied in this form.

6. *On a Caustic-holder.*—In order to cauterize the endometrium with the solid nitrate of silver, and to avoid the excessive effect from a long contact of the agent with the surface (as results when the stick is deposited in the cavity from a tube and left to melt there), various caustic-holders have been devised, which, like those of Scanzoni, Chiari, and Lallemand, either carry the stick of the nitrate into the uterine cavity, or (like that of Barnes and Lente) are coated with the fused agent and then inserted. In either case the agent is applied to the whole endometrium by moving the point of the caustic-holder about in the cavity, until every portion is thought to be touched, and then withdrawing it.

Where it is indicated to use the solid silver-nitrate, this method is unquestionably preferable to leaving the stick in the uterine cavity. I am under the impression that in this country intra-uterine applications are but seldom made in this manner. The caustic-holders are introduced through a speculum like a sound. The effects are likely to be more severe than those of fluid applications. An ingenious and practical method of applying the solid nitrate of silver to the uterine cavity for endometritis has been devised by Dr. S. S. Boyd, of Dublin, Ind. (*American Practitioner*, October, 1880). He cuts a small silver female catheter in two, so as to have three inches of the closed or distal end in one piece. In three-fourths of this closed end he has as many perforations made as possible without materially weakening the instrument, and to the open end of the tube a ring is soldered to which a small cord is attached. After leaving a slippery-elm tent in the uterus overnight in order to somewhat dilate the uterine canal, he places grs. xv. of coarsely pulverized nitrate of silver in the tube, and confining it there by pressing a little cotton on it, he removes the tent and inserts the charged tube through the speculum into the uterus until the tube touches the fundus. The cord is left hanging from the vulva in order that the patient may remove it if serious pain is felt. This tube is left in utero for three to four hours, when the nitrate of silver has been dissolved, and is then removed. By this method, used once a week for four weeks, a patient who had suffered from chronic endometritis for five years, and had been treated by him for two and a half years locally and generally without success, was cured in less than six weeks.

The comments attached to each of the methods described will have made it apparent *which form of intra-uterine medication I prefer, as combining the highest degree of efficiency, facility, and safety. With a moderately dilated cervical canal, I unquestionably prefer the cotton-wrapped applicators; when the canal is of normal width, the medicated tents introduced through a piston-tube; but when the passage has been dilated by artificial means and admits the introduction of at least the little finger, the most satisfactory, safe, and rapid method is to pass a straight cotton-wrapped stick soaked in the fluid di-*

rectly to the fundus. In any case, the effect is immensely enhanced by leaving a cone of cotton soaked in the fluid in the uterine cavity until the organ itself expels it, or the discharge from the cauterized endometrium loosens the cotton and permits its easy removal.

The *choice of the agent and the method* depends, therefore, chiefly on the indication for local treatment and the condition of the uterine canal, but is very often influenced by habit and individual preferences on the part of the operator. Thus some gynecologists prefer iodine (styptic, alterative) and impure carbolic acid (stimulant, irritant) for all the cases in which intra-uterine medication is indicated. Emmet is one of these, and I confess myself, to a certain degree, of the same opinion. Others praise the solutions of the salts of iron, and pure carbolic or pyroligneous acid, for the same purposes, respectively. Others, again, following the lead of Lombe Atthill, of Dublin, believe that fuming nitric acid is *the one* agent for all forms of intra-uterine medication. So far as efficiency goes, I certainly agree with these last named, and also as regards the comparative safety of the agent. But there are very many cases in which milder means will answer quite as well, and in which it is scarcely proper to risk converting the endometrium into a cicatricial surface unless those milder measures fail. The true and really scientific way in the choice of agents and methods for intra-uterine medication is to adapt the nature and strength of the remedy to the severity of the disease; to try the effects of mild measures before resorting to extreme means, and to change the remedy if a fair trial shows its inefficacy. We are prone to become wedded to one peculiar practice or remedy which has always served us fairly, and to be averse to trying others which might do much better.

Precautions.—The general rules to be observed for all methods of intra-uterine medication are: 1. Clearly specify the indication and select the remedy accordingly. 2. Eliminate all counter-indications and elements of danger. 3. Choose the method which can be most thoroughly, safely, and rapidly employed in the given case. 4. Dilate the cervical canal before making the application, if such a course appears necessary to thoroughness. 5. Begin with mild applications until the sensitiveness of the uterus is tested. 6. Make the first application, when possible, at the house of the patient, and keep her in bed or in a recumbent position for at least several hours afterward. 7. Enjoin upon all patients, after every application, to avoid violent exercise or exposure to cold during the remainder of the day. 8. Use the powerful caustics (nitric and chromic acid, iodized phenol) only after dilatation of the cervical canal and at the house of the patient, keeping her in bed for at least twenty-four hours after, and, if necessary, giving her opiates to relieve pain and possible inflammatory reaction. 9. Repeat the milder applications every day, or other day, or twice or once a week, accordingly as the symptoms call for repetition; the stronger agents only after separation of the slough, if still necessary, and if not required, complete the cure by the milder agents. 10. Protect the cervix and vagina by specula, cotton, and tampons, and by mopping up all excess. 11. For styptic,

alterative, and absorbent purposes, iodine (pure or compound) and iodized phenol are the best agents; for a styptic effect alone, the solution of the persulphate or perchloride of iron, mixed with glycerine; as a caustic, the pure nitric acid; as stimulants, pure and impure carbolic acid, plain or with glycerine; as an anesthetic and alterative, iodoform. 12. Occasional changes of remedies will, in chronic cases, hasten a cure, and entire cessation of local treatment for a week or more, every now and then, is often beneficial in giving nature an opportunity to repair the injury. If a wound or living surface is constantly irritated, it very naturally is unable to return to or preserve its normal condition, and the very means then which are intended to cure, serve to maintain the unhealthy condition. 13. Always tell the patients that only perseverance will result in recovery, and that a too early cessation of treatment will surely be followed by a relapse.

Counter-indications and Dangers.

The same conditions which prevent the use of the sound or probe will, to a greater degree, counter-indicate applications to the endometrium. All acute and subacute inflammatory conditions of the uterine substance or adnexa are absolute counter-indications. All such conditions in which no evidence remains of the inflammation but a tenderness of the thickened parametrium on pressure, so-called "chronic parametritis and perimetritis," will admit of applications, if the gain is proportionate to the risk of lighting up the inflammation. When the uterus is fixed, and the inflammatory residue is so old as to be cartilaginous or cicatricial, no particular harm can come from swabbing the endometrium. But special care should be taken to eliminate every case in which pressure in the vaginal vault causes decided pain, or where the history of the case gives a tendency to febrile reaction after every local interference. When I speak of inflammation as a counter-indication, I mean, of course, inflammation of the substance of the uterus, and of the peritoneum and cellular tissue surrounding it; not of the mucous membrane, which is precisely one of the conditions we desire to cure by applications.

Uterine hemorrhage does not constitute an objection, when it is this very symptom which we are consulted for. I constantly apply tincture of iodine or tincture of the persulphate of iron to the endometrium during hemorrhage, either profuse menstrual, or intermenstrual, when general remedies fail. The objection to an examination so frequently made by these patients, that they are flowing, is precisely the reason why they should be examined and its cause ascertained, and if this fails, the flow should be arrested by local means, either repeated vaginal tamponing, or intra-uterine applications, or both.

The *danger* of these applications appears from the foregoing remarks, viz., the lighting up of a fresh or the rekindling of an old, pelvic peritonitis or cellulitis. There can be no question that this danger is run with every application beyond the internal os. But out of thousands of applications of the kind, the agents chiefly used being tincture of iodine and

carbolic acid, with a fair number of strong nitric acid, I have but one instance in which an inflammatory reaction followed; and even in that case the dull curette which was first employed may fairly bear its share of the blame.

The usual sensation felt after any intra-uterine application is that of a warmth, a glow, in the suprapubic region. This lasts from several minutes to several hours. Not unfrequently my patients have complained of suprapubic soreness for a day, or there has been actual pain for the same time. Uterine colic (sharp contractile pain) was rare, and usually in cases where the internal os was narrow, and coagula or albuminates were retained in utero. In four cases only did I observe decided shock: 1. After application of strong nitric acid through the applicator-syringe in an undilated uterus, at the home of the patient, who collapsed decidedly, and required repeated stimulation with brandy and ammonia, and hot bottles all about her, before reaction set in; no further bad results followed. 2. After the introduction of a solution of nitrate of silver, ʒ j. to ℥ j. by the applicator-syringe in chronic endometritis. Normal cervical canal; hysterical patient; severe uterine colic; collapse; vomiting; brandy and hypodermic of morphine; able to leave office in carriage after two hours; confined to bed for several days by abdominal pain, but nothing further. 3. After application of Squibb's impure carbolic acid, by applicator-syringe in my office. Uterine canal, normal; collapse, syncope, lasting half an hour, no stimulus needed, no bad results. 4. Virgin, Churchill's tincture of iodine for menorrhagia; repeated previous applications on cotton-wrapped applicator entirely painless and innocuous; after single careful use of applicator-syringe immediate violent pain in right ovarian region, moderate collapse; morphine hypodermically; no subsequent bad result. These four cases all occurred after the use of the applicator-syringe, and the shock may, therefore, possibly have been due to the rapid saturation of the cotton, and escape of a few drops into the uterine cavity. I certainly have seen no such symptoms follow the use of the ordinary cotton-wrapped applicator.

At a discussion on Intra-uterine Medication, held at the fourth annual meeting of the American Gynecological Society, in Baltimore, in September, 1879, so careful and experienced an operator as Dr. William Goodell, of Philadelphia, expressed his growing satisfaction in the use of intra-uterine injections, which he makes with Buttles' syringe, throwing in carefully four to eight drops of pure carbolic acid, or iodized phenol, with a small amount of hydrate of chloral added. He obtains much better results from these injections than from applications, and taking care to have the canal always patulous, fears no bad consequences therefrom. Dr. Goodell's experience certainly should carry great weight with it. But in the discussion referred to he was almost alone in his recommendation of intra-uterine injections, the large majority of the gentlemen present, all men of large experience, expressing themselves decidedly against them. In France Leblond has recently reported a small series of cases in which they were used without danger and with success. But he, like Goodell and all who use or permit them, makes a widely patulous uterine canal a

sine qua non; and that being present, as already stated, I should prefer to do away with all risk and swab out the cavity with the straight cotton-wrapped stick, either unguarded or through a straight metal or glass canula.

As regards the danger of producing inflammation by the application to the uterine cavity of strong nitric acid, I am disposed to agree with Atthill, who believes it to be as safe as it is efficient. Only once have I seen a reaction follow the thorough repeated swabbing of the endometrium with nitric acid, even after the superficial portion of the hyperplastic mucous membrane had been removed with the dull curette, when the uterine canal has been so freely dilated as to readily admit the cotton-wrapped stick and allow the escape of the secretions. The immediate pain of the application even hardly exceeds that of iodine or carbolic acid. In the one exception referred to, a pelvic cellulitis followed the curetting and application to the endometrium of nitric acid.

Besides the immediate danger of inflammation, there is a secondary accident to be feared from the most powerful applications, the escharotics, only, and that is the cicatricial contraction of the internal os, the sealing-up of the uterine cavity. Barker and H. P. C. Wilson report cases of this accident after nitric acid; the constriction of the external os following the solid nitrate of silver has been already referred to. I have seen no such result after nitric acid in any of my cases, but can readily understand how it might occur. Avoidance of too deep and too frequent cauterization, and frequent sounding of the uterine canal for some time after, will usually prevent such stenosis.

Therapeutic Value.—After this long and elaborate discussion of intra-uterine medication, it may seem strange that I should think it necessary to say anything as to the therapeutic value of this treatment. But, in spite of the universal employment of the various methods described, and the ease with which the results of the treatment can be controlled and estimated, weighty authority still seems to doubt their reputed efficacy. At the meeting of the American Gynecological Society above referred to, the President, Dr. T. G. Thomas, expressed himself as follows: "While intra-uterine medication beyond the internal os is in many cases exceedingly beneficial, I feel fully impressed with the idea that, as a general rule of practice, it is much more honored in its breach than in its observance." He then goes on to explain this opinion by saying, that uterine catarrh usually depends on conditions not inherent to the mucous membrane of the cavity itself, but consisting in displacement, subinvolution or hyperplasia of the uterus, laceration of the cervix; or the catarrh may be due to fungoid development of the mucous membrane. The proper method to cure the catarrh in these cases is to remove its primary cause, rectify the displacement, reduce the hyperplasia, stimulate the uterus to involution, sew up the cervix, curette off the fungoid growths of the mucous membrane. He then admits the presence of idiopathic endometritis, but omits to tell us how he cures it, although admitting the propriety of intra-uterine medication in these cases. What Dr. Thomas says as regards first removing

the cause of the endometritis is very true, and the only rational mode of procedure ; but, how are we to relieve the hyperplasia, or cure hemorrhage in which the curette fails to show the presence of fungoid or granular degeneration of the mucosa ; or stimulate a torpid uterus to involution or menstruation, without, at the least, the assistance of intra-uterine medication? While I do not go so far as Dr. Goodell, who passes every application to the fundus, even though there is no evidence that the catarrh extends beyond the internal os, and while I believe that the disease is in many cases confined to the cervical cavity, and the medication, therefore, need not be carried higher up, I am compelled to confess that I fail to see how the numerous cases of chronic endometritis, hyperplasia, subinvolution, hemorrhage depending on pulpiness or flabbiness of the endometrium, can be cured without local applications to the uterine cavity. Of the value of local cauterization of malignant growths in the uterine cavity there can be no question, although of course such treatment is but palliative.

VII. DILATATION OF THE UTERUS.

In the chapter on Examination I have already spoken of dilatation of the uterus for diagnostic purposes. How to accomplish this dilatation not only for diagnosis, but also, and chiefly, as a means of treatment, is the subject of this section.

An indispensable condition to all measures for dilatation of the uterine canal is the patency of the vagina and accessibility of the cervix. In the absence of this condition, the dilatation of the vaginal canal by tampons, specula, bougies, expanding instruments, and the employment of means calculated to increase the mobility of the uterus (iodine to vaginal vault, traction on cervix), should necessarily precede the attempts at expansion of the uterine canal.

The operation of opening up the uterine cavity to the finger and instruments may properly be divided into two main sections, according as the dilatation is performed with or without cutting instruments. I shall first describe the various methods without cutting instruments, and then speak of the operation for opening the uterine cavity with knife or scissors, the so-called "bloody" dilatation of the canal, in contradistinction to the other "bloodless" procedure. The cutting operation is naturally a rapid and immediate method.

Dilatation without Cutting Instruments (Bloody Dilatation).

Methods and Instruments, and How to Use Them. — There are two methods of dilating the uterine canal without knife or scissors, and they differ simply in the degree of rapidity with which the dilatation is accomplished.

a. *Rapid dilatation* (that is, within fifteen minutes, and at one sitting) is effected by means of graduated sound-like instruments, which are forced

through the uterine canal one after the other; or by steel two- or three-branched instruments, which are introduced closed and then expanded by an external mechanism; or by tubes or bags of rubber which are inserted in a collapsed condition, and are then inflated with air or water; or by the finger.

Graduated Sounds.—In 1870 the late Dr. E. R. Peaslee devised a series of graduated metal sounds which were arranged to screw into one handle. There were either five or three in the set. Later these dilators were made

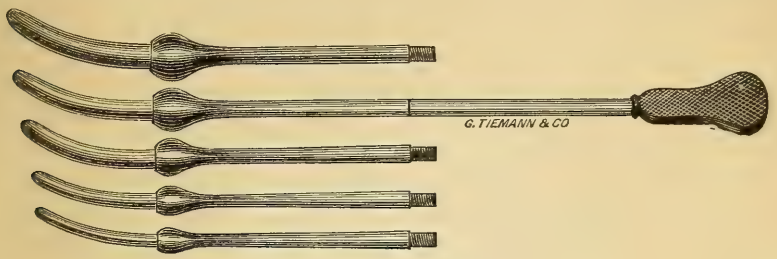


FIG. 115.—Peaslee's Uterine Dilators.

of hard rubber. Dr. Horace T. Hanks modified them slightly by placing two dilators of different size on one handle, and making eight sizes instead of five. Both these instruments are but modifications of the old dilators of Simpson, of which there were twelve in a set. They were destined to be left *in situ* for an hour or more, and the handle is therefore provided with a slide by which the dilator can be detached when it has been introduced. A tampon keeps it in place, and it is withdrawn by the string attached to it. All these dilators are provided with a circular enlargement at a distance of about two inches from the point to prevent their too deep insertion. These sound-dilators are introduced in the following manner: Through the speculum (large tubular, valvular, or Sims) the cervix is seized with a stout tenaculum (best a double tenaculum) which seizes one lip of the cervix between its blades, and the uterus is slightly drawn down and straightened. The direction of the uterine canal having been ascertained by the sound or probe, the smallest-sized dilator is inserted into the

FIG. 116.—Hanks' Uterine Dilator.

os and forced upward toward the internal os, the cervix being steadily held by the tenaculum. As soon as the whole dilator has been introduced, it is allowed to remain a few moments, then withdrawn and the next size forced in, and so on until the desired amount or the limit of dilatation has been reached. The last dilator may be allowed to remain in utero for fifteen minutes or longer, or, if only temporary dilatation is desired, may be removed at once when the desired degree has been accomplished. It is of prime importance in using these dilators that there be as little difference

as possible between the sizes. The objection to those of Peaslee and Hanks is that there are not enough of them. To overcome this difficulty Professor Hegar, of Germany, has constructed a series of about twenty-five dilators, ranging from the size of a fine probe to an inch in diameter. By means of these the most rigid cervical canal can be easily dilated within thirty minutes.

This maneuvre may be practised in the office or outdoor clinic, if it is not attended with too much pain or the degree of dilatation desired is not very great. The ease with which the dilatation succeeds depends entirely upon the amount of elasticity and density of the uterine tissue. Some uteri are dilated with scarcely any force, others resist even the most persistent efforts. Upon this degree of resistance will depend, to a great extent, the amount of pain experienced by the patient, and the consequent advisability of performing the operation at the home of the patient, putting her under an anesthetic, and keeping her in bed for a day or two after. If a permanent and very thorough dilatation is intended, the latter precautions are certainly advisable. I have frequently practised dilatation on outdoor patients, but have never been able to obtain more than a moderate and temporary result unless the patient was anesthetized, and the operation was thoroughly done.

If a sufficient dilatation and the desired object are obtained at one sitting, of course it need not be repeated; but if a systematic gradual dilatation of the uterine canal is intended (as in stenosis), sterility, dysmenorrhea, flexion), the sitting should be repeated every day or two, according to necessity and the endurance of the patient.

A very thorough expansion of the uterine canal can certainly be accomplished by these graduated sounds, provided the tissue of the uterus is not too dense and a sufficiently firm hold can be secured of the cervix to resist the forcible upward motion of the sound. And these two points are precisely the great objections to these instruments. The force required to thrust the sounds through the narrowest portion of the uterine canal, the internal os, and the part immediately above it (the isthmus uteri of Spiegelberg) is usually very great, so great, indeed, that the cervix is very liable to be badly torn by the tenaculum. And only when the tissue is but moderately dense and fairly elastic is it possible to pass any but the smallest-sized dilators. This is especially the case in the long conical cervices of nulliparous women, in whom this method of treatment is specially indicated. It is evident that a certain degree of force is required to pass even a wedge through a movable body, and the amount of traction necessary to counteract this force and steady this movable body, must, of course, be proportionate. The constriction once overcome, however, and the uterus thoroughly dilated, the result is usually a more permanent one, because the expansion is uniform in every direction, than when the branched dilators are used.

The degree of dilatation differs with the indication. If it is desired to introduce the finger, of course that size must be obtained, and several daily sittings are often required. If it is merely intended to open the

canal sufficiently to allow the more ready escape of the menstrual fluid, or the entrance of the spermatozoa, a dilatation up to one-fourth of an inch is all that is necessary. In the latter cases the treatment, in order to achieve permanent results, generally requires to be continued for some months, the sittings being gradually diminished until the permanent patency of the canal renders them no longer necessary.

The uterine canal, as a rule, contracts very rapidly after dilatation, and such cases in which it is desired to maintain the canal at a certain dimension need frequent revision, and, as the occasion may be, corresponding repetition of the treatment. Thus, in dysmenorrhea or sterility with hard, long, slender cervix, and narrow, perhaps flexed, canal, the dilatation may require to be repeated every day for some weeks, and once or twice a week for several months before the canal remains permanently open.

In order to avoid the laceration of the cervix, which almost invariably ensues from the tenaculum when any considerable force is required to pass the sound dilators through the cervical canal, Professor Fritsch, of Breslau, has recommended a method of introducing these dilators, which is certainly original, and, I should think, effective. He uses steel sounds, the thinnest of which has a diameter of 0.5 mm., the largest 15 mm., with three intermediate sizes, $7\frac{1}{2}$, $9\frac{1}{2}$, $12\frac{1}{2}$ mm. He puts the patient under chloroform, and having explored the way with the sound in the ordinary manner (the patient on her back, without speculum) he inserts the point of the sound into the cervical canal, and supporting it with the intravaginal finger, presses it firmly upward in the direction of the internal os, at the same time the outer hand grasps the fundus uteri and steadily pushes it down over the sound, as a glove is slipped over the finger. This sound is then replaced by a larger one, and so on. Fritsch admits that the force needed to accomplish this is very great, and would be entirely unjustifiable if the uterus were not well watched by the outer hand. But he is, no doubt, right in asserting that such a force is allowable when applied in this manner, and succeeds in its object, while a lesser force applied without the assisting outer hand would fail or be injurious. The great point about this plan is that the dilator is not forced into the uterus, but the latter pushed over the dilator. Fritsch goes so far as to discard all methods of slow dilatation when the object is merely to dilate the uterus. He has witnessed no bad results from the force employed. The plan seems to me an excellent one, far superior to the old method of forcing the dilators up through the speculum, while the tenaculum holds the cervix. It would probably be feasible only in those cases in which the fundus can be plainly mapped out by palpation, and grasped by the outer hand; in stout people, or with very rigid abdominal walls, this would not be possible. But in cases where an angle of flexion forms an obstacle to the dilator, the manipulation of the uterus by the outer hand would straighten the canal and facilitate the passage of the internal os. I have repeatedly succeeded in introducing a stem-pessary in this manner when it was impossible to get it through the flexed canal in the usual manner (on a sty-

let through a Sims speculum). It would probably be necessary to have the sounds all made of steel and in one piece for this method, in order to insure sufficient stiffness and inflexibility.

For the rapid dilatation of an already partly dilated cervical canal, as at the beginning of a miscarriage, or in rigidity of the external os during labor at term, or for the removal of intra-uterine polypi and fibroids, Dr. Hanks has had constructed a series of much larger, olive-shaped dilators of hard rubber, which are attached to a handle by a screw, and are intro-

FIG. 117.—Hanks' Large Cervical Dilators.

duced through a speculum precisely like the smaller sizes. They are designed to take the place of Barnes' obstetric dilators, which often burst and are liable to spoil. The advantage of having an instrument by which the cervix can be immediately dilated when it is desired to remove a retained placenta after a miscarriage, can be appreciated only by those who have labored hard for an hour or more to effect this through a canal barely passable for one finger.

Steel-branched Dilators.—The principle of construction and mechanism of all the instruments of this class is the same, viz., two, three, or four sound-shaped blades, which unite in one shaft, are introduced through the internal os in the closed condition, and are then separated by a contrivance in the handle to any desired width within the limits of expansion peculiar to each instrument. Instruments of this kind have been devised by Simpson, Priestley, Sims (three blades), Nott, Hunter, Ellwood Wilson,

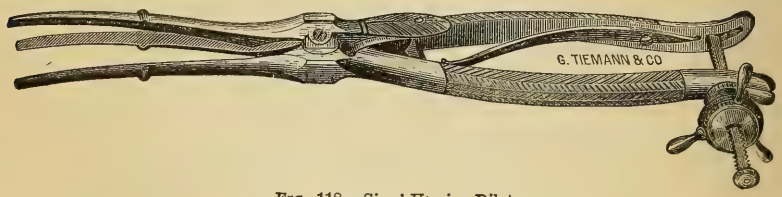


FIG. 118.—Sims' Uterine Dilator.

White, Ellinger, Palmer, Ball, and various others. Those of Sims, Wilson, Ellinger, and Palmer are probably best known and most used by the profession.

That of Ball is, perhaps, the most powerful instrument of the collection. The mechanism of these instruments is plainly shown in the cuts.

The intra-uterine blades are two and one-half inches long, slender, rounded, and, when separated, parallel to each other, in order to secure an equal expansion of the internal os with the rest of the canal. But, as a

rule, they feather slightly, and this is as it should be, to prevent a too powerful expansion at the most dangerous point of the uterine canal. That of Ball does not feather, and any of the others can be made perfectly rigid by simply increasing the size of the blades. The rounded point of the united blades should but slightly exceed in size that of the ordinary sound, so that it can be passed through any normal internal os. At the junction of blades and shank, there is an angle of expansion to show that the limit of the normal uterine cavity has been reached when this point is at the external os.

I formerly used Ellinger's dilator, which I brought with me from Stuttgart, the home of its inventor, but I now prefer that of Palmer, which is rather more powerful, does not feather, and the action of which is regulated and maintained by a screw in the handle.

The limit of expansion of the blades is one inch to one and one-half inch, but this is seldom required. In ordinary daily practice one-half inch is the limit to which dilatation should or need be carried.

These dilators can be either introduced on the finger alone, like the sound, or through any speculum which is roomy enough to allow the manipulation of the handle generally necessary to guide the point through the internal os. In either case the direction and width of the canal should have been ascertained by the sound before attempting to introduce the dilator. If a speculum is used the cervix may be steadied by the tenaculum in the anterior lip, or it may be dispensed with if the uterus is not very movable. The dilator having been warmed and well greased, is inserted

FIG. 119.—Ellinger's Uterine Dilator.

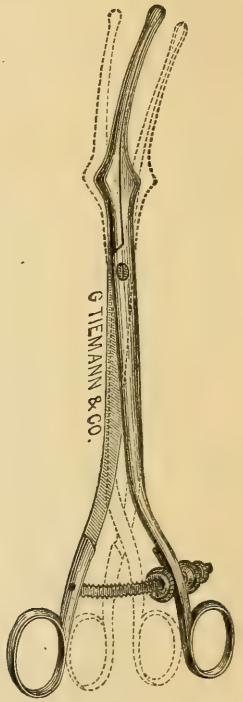


FIG. 120.—Palmer's Uterine Dilator.

into the cervical canal, the right hand holding it between thumb and first two fingers like a pen, and when it has been introduced as far as the expansion or angle where the intra-uterine portion begins, the blades are gently separated either by approximating the handles, or turning the screw in the handle, in accordance with the construction of the instrument. In Ellinger's instrument the compression of the handles and expansion of the blades is regulated merely by the pressure of the hand, and is therefore liable to be more sudden, forcible, and unequal. The addition of a screw to the crossbar would be useful, and would enable the operator to maintain a certain amount of dilatation without active movement on his part. All the other dilators act by means of a screw in the handle. If a Sims speculum is used, the point of the dilator may be gently pressed through the internal os by resting the backs of the angle of the instrument (where the blades begin) against the blade of the speculum in the vagina, and using this point as a fulcrum. The point of the dilator will then usually slip through the internal os without further trouble. Care should be taken to use but very little force, else the point might suddenly strike against the fundus. If the internal os should prove too narrow, a smaller dilator must be used, or the smallest size of Hanks' sounds may first be inserted. But the arrest of the point by a pocket or rugosity in the cervical mucous membrane should not be mistaken for a narrow internal os. The sound will show the way.

FIG. 121.—Ball's Uterine Dilator.

The amount of dilatation to be employed or allowed in any given case will depend upon the object desired, the sensibility of the patient, and the dilatability of the uterus. As a rule, in ordinary dilatation for the purpose of facilitating intra-uterine applications, and in dysmenorrhea and sterility, an expansion of the blades to the width of one-fourth to one-half inch is all that is required. Indeed, in many cases, it is all that is feasible at one attempt, unless the patient be anesthetized. With Ellinger's and Wilson's dilators the amount of internal expansion can be read on the graduated crossbar at the handles; in the other instruments it must be guessed by the number of turns of the screw, as previously ascertained. When the dilatation has been maintained for a few minutes, the number of which depends upon the permanency of the result desired (three to fifteen under ordinary circumstances), the instrument is closed and withdrawn. If there is any hemorrhage, the vagina is cleared of the clots with cotton on a dressing-forceps, and a few flat tampons may be introduced, if thought advisable. The patient should be directed to remain quiet for the remainder of the day, and particularly to avoid exposure to cold.

The pain experienced during this operation corresponds to the amount of dilatation and the sensitiveness of the patient. It is generally quite acute so long as the blades are still being expanded, but soon subsides when they are kept immovable, and rarely continues after the instrument is withdrawn. It certainly is very much less than that endured during dilatation with the graduated sounds; at least that is my experience. Occasionally the pain lasts during the remainder of the day.

As a rule, it is not necessary to anesthetize the patient when no greater expansion than one-fourth inch is desired. Therefore, the operation may be performed in the consulting-room or outdoor clinic, and I have so done it hundreds of times, keeping the patients for half an hour afterward, and then sending them to their homes, often miles away. In but two instances was a bad result reported to me after this treatment. In one case quite a profuse hemorrhage followed the dilatation, and there was considerable peri-uterine tenderness for a few days; in the other, a sharp attack of pelvic peritonitis occurred, but as curetting and iodine application to the endometrium were practised at the same sitting, the blame may fairly be divided between these three manipulations.

When more thorough dilatation is intended, the operation should always be done under anesthesia at the home of the patient, who should be kept in bed for several days and treated prophylactically (morphine, ice on abdomen) against possible peritonitis or cellulitis. If very sensitive, opium suppositories may be given for a day before the operation.

The frequency of this dilatation is subject to the same rules which guide dilatation by sounds, viz., the indication, and the endurance of the patient. I have repeated it three times a week for several months in dysmenorrhea and sterility, with decided benefit as regards the former difficulty and occasional relief of the latter.

In sharp flexion or contracted uterine canal, particularly with pointed conical cervix, where it is specially desirable to keep the canal dilated and the external os open and thus facilitate conception, I have seen very good results from performing thorough dilatation under an anesthetic at the home of the patient with one of these divergent dilators, or by repeated introduction of tupelo-tents (hereafter to be described), and then inserting a solid glass or hard-rubber stem and allowing it to be worn for a number of months. When the canal seems permanently dilated the plug may be removed, and an opportunity be given for conception to take place. A long retention of these stems is liable to produce a chronic cervical catarrh, and of course the usual precautions against inflammatory reaction attending these stems (see chapter on Intra-uterine Stems) should be observed. Frequent examinations are required to guard against reclosure of the uterine canal, care being taken to examine and, if necessary, dilate only immediately after a menstrual period so as not to produce an abortion.

It may be stated that in an emergency (such as an application for hemorrhage, introduction of curette) the ordinary uterine dressing-forceps may be inserted and used as a dilator, if the canal is not abnormally constricted.

One of the great objections to these complicated dilators is the difficulty in keeping them clean. They should be washed in hot carbolized water after every operation, and kept well coated with vaseline to prevent rusting. Another objection is their expense, which, however, is, in my opinion, more than counterbalanced by their utility. I should miss my dilator greatly in the treatment of sterility and dysmenorrhea, as well as in intra-uterine medication. The objection has been made to two-bladed dilators that they dilate only laterally, and, therefore, do not give the circular expansion which it should be our object to obtain. This is true ; but in the first place, I do not think it so essential to have this circular expansion ; secondly, we can obtain an expansion in every direction by turning the dilator so that it will expand sideways ; and lastly, the thickness of the united blade of a three- or four-bladed dilator would prevent its use in very many of the cases where this convenient, rapid dilatation is most useful—those cases with long, conical cervices, narrow, and flexed uterine canals. If very thorough circular dilatation is required, we have other means, still to be described, at our command.

In flexions, it is a good plan to reverse the uterine angle or curve, and then dilate, thereby stretching fibres which would probably escape if the abnormal shape of the uterus is not altered, and giving the uterine canal a (at least temporary) different curve. In course of time it might result in a compromise between the primary angle and the reverse, and the normal mild curve remain. Besides, the ligaments are alternately relaxed and tightened by this maneuvre.

Sometimes I think it advisable to alternately expand and close the dilator, turning it as I do so, thinking thus to get a more uniform dilatation of the canal.

Rubber Tubes and Bags.—The instruments of this class consist of tubes and bags of soft rubber of different sizes, which are introduced in a collapsed state into the uterine canal, and there inflated with air or water. By introducing size after size, a very thorough dilatation may be reached in a short time. The objection to all instruments of soft rubber is that the rubber is very liable to become brittle and crack unless kept constantly moist. One may thus experience the annoyance of seeing one of these tubes burst during expansion.

The most serviceable contrivance of this kind is that of Molesworth, which consists of a series of four rubber tubes, the largest six inches long by one inch diameter, the smallest four and a half inches long by one-fourth of an inch thick. The dilating capacity of these tubes is at least double their undilated diameter. Each tube is provided with a flexible central guiding-rod of metal, by which a curve to suit the uterine canal can be given it. The tube screws into a hollow metal rod six inches long, which again screws to the nozzle of a metal syringe, the piston-rod of which is provided with a screw-catch at the central end of the barrel, so that the piston can either be propelled rapidly, or, if the catch is fixed in pins at the barrel, slowly, by simply screwing the piston down until the limit of dilatation is reached. By this contrivance the tube may be ex-

panded as rapidly or as slowly as the operator may desire. An escape-tube of rubber guarded by a stopcock is attached to the nozzle of the syringe.

The manner of using this dilator is the following : The syringe is filled with water, usually warm ; the dilating tube of proper size is well greased, the curve of the uterine canal (of course previously ascertained by the sound or probe) given it, and it is screwed to the metal tube. Under guidance of the finger the dilator is then inserted into the cervical canal and through the internal os, which must, of course, be permeable to this extent. The syringe is then screwed to the tube, and the dilatation begun. In the uterine canal this dilatation should usually be slow and gradual, that is, by screwing down the piston-rod in the manner described. In the vagina, rectum, or when the uterus is softened and easily dilatable (as in abortion or labor) more rapid dilatation may be exercised ; but the dense unyielding tissue of the non-gravid uterus will require more gradual force.

When the limit of dilatation has been reached, the stopcock is turned transversely and the reflux of water shut off. The dilator may then be

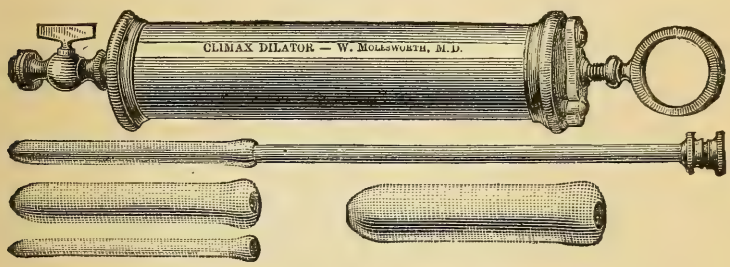


FIG. 122.—Molesworth's Water Dilator.

allowed to remain in utero for as long a period as appears desirable to secure a permanent result ; or, if the object was to dilate a rigid os during labor until uterine contractions expel the tube. If it is desired to inflate the tube with more water than the syringe holds, the stopcock may be closed and the syringe refilled from the vessel through the rubber tubing attached. (This is omitted in the diagram.) On opening the stopcock again as much more water may be injected as appears desirable. The capacity of the largest tube is about one and a half syringes, that of the smaller tubes in proportion. After sufficient dilatation has been accomplished, the tube may be removed in its dilated condition, or, what is preferable, the water is withdrawn by the syringe and ejected through the side-tube. A stopcock in the hollow metal tube would be useful, as we could then close it and remove the syringe, leaving the dilator in place as long as desired. Now the stopcock is on the nozzle of the syringe, and the latter can therefore not be removed separately without allowing all the water to escape from the tube.

The one objection to this instrument (besides that belonging to all soft-rubber instruments, of drying and cracking when not in use) is, that the greatest expansion of the tubes is at its middle, and that therefore the

two ends, which come precisely where we want the most expansion—at the external and internal os—are but little dilated. When dilated the tubes have an ovoid shape and really only the three middle inches of the longest tube can be said to be thoroughly dilated. Now, in the elongated cervix of pregnancy, this deficient dilatation of the two ends of the tube entails a corresponding want of dilatation of that part of the uterine canal, and was the source of great annoyance and delay to me in a case of abortion at the third month. While the cervical cavity was widely dilated, both the internal and the external os, chiefly the latter, remained small, and the greatest difficulty was experienced in extracting the fetus and placenta through it. Another objection is that the flexible metal guiding-rod in the tube reaches only to within half an inch of the end of the tube, which is thus enabled to double over and obstruct its introduction. A third objection is the expense of the instrument, which of course is enhanced by its liability to spoil unless frequently used. By keeping the tubes greased with vaseline, and frequently wetting and greasing the piston of the syringe, the instruments may be preserved for a long time.

In spite of these objections I have found Molesworth's dilator an exceedingly useful instrument, one I should regret to miss in cases where a rapid, easy, thorough dilatation of an already somewhat patent, yielding canal is desired. It has done me excellent service in dilating the rigid os for the expulsion of the ovum or manual removal of the placenta in abortion, and in the first stage of labor ; in stricture of the rectum ; and dilating the female urethra. I have no experience with it in dilating the canal of the unimpregnated uterus, but should certainly expect equally good service from it in uterine polypi and fibroids, and in any case which admits the passage of the smallest tube.

An instrument for the same purpose has been devised by Emmet. Into the lower edge of an oblong rubber bag enters a rubber tube with closed end, which reaches to the tip of the bag, and through which a stout flexible sound is passed as a guide, in inserting the dilator. The bag is dilated by water injected through another tube, which has a stopcock. When the bag is partially dilated and retains itself, the sound by which it was introduced is removed, and additional water may now be injected as the case demands. Emmet has found this instrument useful, not only for completing the dilatation begun by sponge-tents or an intra-uterine tumor, but also for arresting hemorrhage by direct pressure. In ten or fifteen minutes, any necessary dilatation can usually be effected, especially if the parts have been prepared by a sponge or other dilating tent, or are soft and yielding.

Of the violin-shaped rubber bags, known as Barnes' dilators, it is not necessary to speak here, since they would be of but little service in gynecological practice, being too large to be introduced into a cervix which is not already pretty well dilated. They are especially intended for obstetrical cases.

The index-finger can be used to dilate the cervical canal when the os is sufficiently patulous to permit the introduction of the first joint, and

the uterine tissue is soft and elastic. When the uterus has the density and inelasticity peculiar to the normal unimpregnated organ, the finger will scarcely succeed in dilating it. In order to accomplish digital dilatation, counter-pressure on the fundus by the other hand is usually indispensable. This dilatation with the finger comes into play most frequently when previous dilatation by bougies, dilators, or tents has prepared the way, or the canal has begun to contract again after such dilatation.

b. *Gradual dilatation* (*i.e.*, within twelve hours) is accomplished by porous substances shaped to fit the uterine canal, which gradually swell

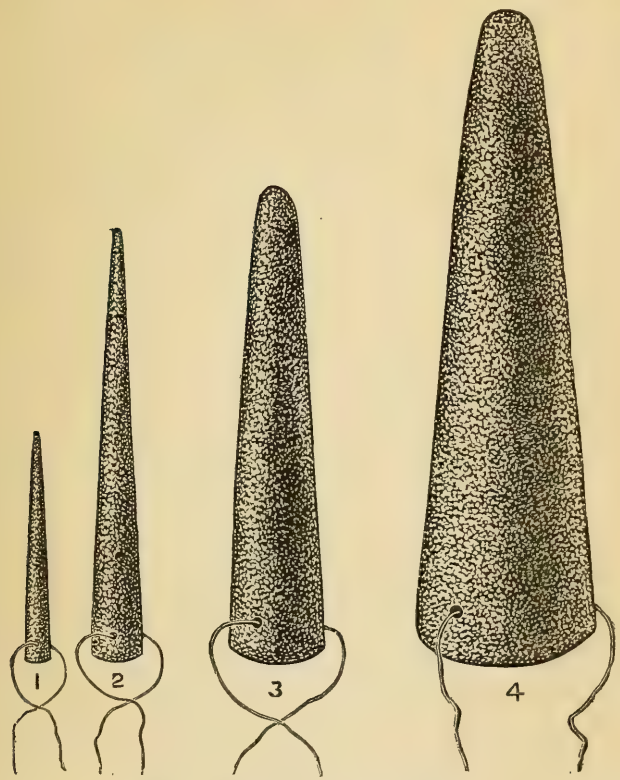


FIG. 123.—Different Sizes of Sponge tents.

through imbibition of the fluids from the surrounding tissues. These porous bodies are called uterine *tents*. There are a number of substances from which these tents are made, those now in use being chiefly sponge, laminaria, tupelo, slippery-elm bark, elder and corn-stalk pith, gentian root. Of these, only the first three can be said to be universally popular.

Sponge-tents.—If a piece of fine sponge is soaked in a solution of gum-arabic, or melted wax, and then rapidly compressed to its smallest limit, it will be found on hardening to have become a firm solid mass. If this sponge is now placed where the gum-arabic, or wax with which it is impregnated, will dissolve or melt, and where fluid can be absorbed by the

sponge, the latter will rapidly swell and regain its size before compression. On this principle, the sponge is used to dilate the uterine canal, the vagina in stenosis, the rectum in stricture, the nasal cavity for the removal of polypi, and the canals of wounds when the removal of some body at the bottom of the narrow canal is desired. For use in the canal of the uterus, the sponge before compression is cut into cones of different sizes and length, and when compressed the tents have the shape and appearance presented in Fig. 123. The compression is made by winding cord tightly about the moist sponge, which cord is removed when the sponge has hardened. The sponge-tents found in the trade are all made in this manner. The surface of the tent is rendered smooth by sand-papering, and many tents are coated, besides, with a thin film of wax, or gum-arabic, which renders them more easy of introduction. Through the base of the tent a stout cord is passed, by which it can be withdrawn. The conical shape of the sponge-tents ordinarily sold is objectionable for the reason that the tapering portion of the tent usually lies precisely where the most expansion is desired, viz., at the internal os. I have therefore generally cut off half an inch or more of the tip of the tent, and thus secured more complete distention at the narrowest portion of the canal. Dr. Albert H. Smith, of Philadelphia, has his tents made cylindrical, instead of conical. They are less easy to introduce, it is true ; but this objection must be met by previous dilatation by one of the rapid dilators already described.

There are many sizes of sponge-tents furnished, varying from that of a knitting-needle, to that of the middle finger, and from two to four inches in length. The dilating capacity of these tents is about twice their compressed size (two hundred per cent.).

It is now so easy to procure any size and number of sponge-tents at the instrument-makers' or druggists', tents which are much neater and smoother than the amateur can make them, unless much trouble be taken, that it is scarcely necessary for a physician, living within easy distance by mail of any city, to know how to make them himself. The brief directions given above will, however, enable him to do so, should a sudden emergency arise, and no tents be at hand. Dr. Beverly Cole, of San Francisco, has shown a very rapid way of making compressed sponge, by simply dipping a suitable piece of sponge in melted wax (which can be had anywhere), placing the hot waxed sponge between two sheets of bibulous paper, laying it on the floor, or a hard chair, with a book over it, and standing or sitting on the book for a few minutes, until the wax has had time to harden. The amount of compression will naturally depend greatly on the weight of the individual. The flat compressed sponge can then be cut with a pocket-knife into any desired shape.

An objection to this thorough impregnation with wax is that it takes rather a higher temperature to melt the wax than the body affords, and that the imbibition and expansion of the sponge is not quite as thorough, perhaps, as when a soluble ingredient is used.

Some gynecologists have given the tents a curved shape, to conform to the direction of the uterine canal, and doubtless it is easier to introduce

such a curved tent through a flexed canal. When the tent swells, it becomes straight, and thus acts quite as well in straightening the uterus as the straight tents.

Professor Ellerslie Wallace, of Philadelphia, has inserted a slender watch-spring in the curved tent, giving the spring the opposite curve to that of the sponge, and uses this contrivance to straighten a retrodisplaced and slightly adherent uterus. When the sponge swells, the spring begins to act and draws the fundus uteri up, and thus stretches the adhesions. The idea certainly seems very plausible, but I have no experience with the method.

The rapidity with which the sponge swells is so great that no time should be lost in inserting it into the uterus, since a moment's delay after it has touched the moist cervical canal results in a roughening of the surface of the sponge, and difficulty or inability to complete the maneuvre. The sponge has generally reached the limit of expansion within an hour from the time of its introduction. But it should be left in the uterus for several hours after its expansion in order to produce a permanent effect.

The peculiar formation of the sponge, the multitude of small alveoli scattered through it, greatly favors the admission of air and the decompo-

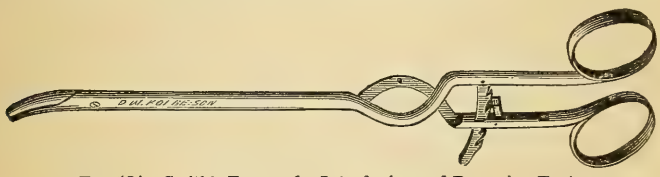


Fig. 124.—Smith's Forceps for Introducing and Removing Tents.

sition of the secretions absorbed into the sponge from the surrounding tissues. The absorption of these putrid secretions by the neighboring blood-vessels and lymphatics is followed by local inflammation and perhaps general septic infection. To prevent this decomposition, sponge-tents are now always impregnated with some disinfectant, usually carbolic acid. Lawson Tait has them soaked in oil of cloves, Aveling in a solution of permanganate of potash. A. H. Smith prefers powdered salicylic acid, the sponge first being coated with soap. The carbolic seems to me the best. But none of these preventives are certain against infection.

Manner of Introduction.—A sponge-tent may be introduced either with or without a speculum. It may be seized in the long dressing-forceps, or it is mounted on a stylet slightly curved like a sound, and is carried up to the cervix and its point inserted in the external os. By means of the forceps or stylet the sponge is firmly pushed into and through the cervical canal, being aided by pressure over the fundus with the outer hand if no speculum is used, or by steadying the cervix with a tenaculum if the operation is done through a speculum. Dr. A. H. Smith uses a stout forceps (Fig. 124) for introducing sponge-tents, which he generally does without the speculum, with the patient on the back.

I have never tried to introduce a sponge-tent without a speculum, fearing that the inevitable contact with the vaginal secretions would

roughen the surface of the sponge, and interfere with its passage, and finding the operation often quite difficult enough when the os was exposed. Still, when the os is patulous and the canal tolerably wide, I do not doubt the feasibility of introducing a sponge-tent in this manner. The crowding down of the fundus uteri over the tent is the one point of this method.

A large and short cylindrical and a valve speculum may give space enough to insert the tent, if the canal is not flexed and of fair width. I prefer the Sims and perform the maneuvre in the following manner: Having exposed the cervix, I seize the anterior lip with the tenaculum, draw down and straighten the uterus. The tent is then impaled on the stylet (every tent has a small hole in its base for the purpose), or is grasped in the long forceps, and is rapidly dipped in an open bottle of pure carbolic acid as an additional safeguard against decomposition. It is then quickly buried in a pot of vaseline and without a moment's hesitation inserted into the os and pushed forward in the direction of the internal os. No time must be lost in these several steps, else the surface of the tent will become rough from the carbolic acid, and a new tent will have to be substituted. When the tent has been forced up through the internal os and its base projects but slightly from the external os, it is held for a minute or two to give its point the opportunity to swell and thus insure its retention; the slide is pushed down and the stylet withdrawn. If the forceps are used to carry the tent, care should be taken not to twist the twine attached to the tent into the forceps-blades; else, on removing the instrument, the tent may also be accidentally dislodged. The vagina is now cleansed of any secretions (blood or mucus), and several carbolized flat glycerine tampons are placed over the cervix to insure retention of the tent and prevent the escape of discharges. The patient is placed in bed and kept there until after the removal of the tent. The expansion of the tent soon gives pain, and I therefore always leave a prescription for several morphine suppositories of one-fourth to one-half a grain each, to be taken according to the amount of pain, and direct that hot applications be made to the abdomen and a hot bottle be kept at the feet.

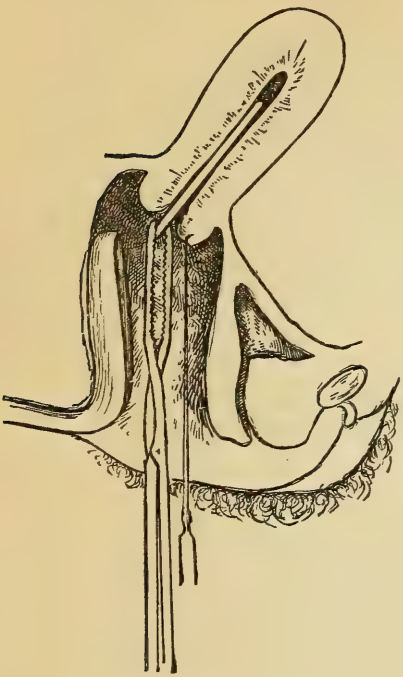


FIG. 125.—Introduction of Tents through Sims' Speculum (P. F. M.).

It is a matter of some importance in choosing the size of tent to be

introduced, not to take too large a one, which may need to be crowded into the uterine canal. As a rule the tent will then catch at the internal os and become so rough and swollen during the fruitless attempts to force it in, as to be worthless. The only thing to do in such a case is to throw the old tent away and do what should have been done at first, select a smaller one, which will easily pass through the internal os. I have repeatedly made this mistake, hoping to accomplish a thorough dilatation in one sitting, but have been obliged to desist and content myself with a moderate dilatation, following it up later with some other method. Besides the annoyance of failing in the attempt and giving the patient unnecessary pain, the inevitable lacerations of the cervical mucous membrane through the tearing out of the tenaculum open channels to septic infection. Occasionally the rapid dilatation of the internal os with a steel two-bladed dilator will permit the introduction of the tent.

Care should always be taken not to push the tent in so deeply as to bury its base within the os. If this be done, when the tent swells the external os closes over it, and it will be found exceedingly difficult to force the enlarged and rough surfaced sponge through the narrow orifice when it is seized by the forceps or string with a view to removal.

If a stylet is used to introduce the tent, it might readily occur that considerable force in pushing up the sponge might thrust the point of the stylet through the whole length of the tent and injure the uterus.

No sponge-tent should be allowed to remain longer than twelve hours, and less will usually suffice. It is therefore a good plan to introduce the tent early in the morning and remove it on the same day toward evening. If introduced in the afternoon, eighteen or twenty hours may elapse before the physician can again see the patient and remove it, and that might be too long. Except where a very decided alterative and stimulant effect is desired, it is better to remove the tent before the twelve hours are up than to prolong the interval. Dr. A. H. Smith, in this respect, follows an entirely different plan from that generally employed ; he leaves the sponge-tent in utero for forty-eight hours, claiming that its removal after twelve to twenty-four hours produces abrasion of the endometrium and hemorrhage, while after a longer period the uterus is paralyzed, the sponge becomes loosened and is easily detached. I cannot judge of this practice from personal experience, but think it, theoretically, very good ; practically, I should fear septic infection.

As already stated, the patient has not left her bed since the insertion of the tent. When the time has arrived to remove it, I again place the patient in Sims' position, expose the cervix with Sims' speculum, remove the tampons, and seizing the sponge firmly with the dressing-forceps give it a slight rotary motion to dislodge it, and then draw on it steadily and forcibly. The uterus is thereby forcibly drawn down, and to steady it I place two fingers of my left hand on either lip of the cervix, or encircle the cervix with the loop of the depressor. A very convenient instrument for this purpose has been devised by Sass. Considerable force is often required to remove a sponge-tent, in consequence of the intimate relations between

the minute surface particles of the sponge and the inequalities of the mucous membrane. The result is that the membrane is generally considerably torn and excoriated, and it may even be removed almost *in toto*. This property of the sponge dilator has been used as a therapeutic agent in hyperplastic endotrachelitis and enlargement of the Nabothian glands, which are torn off, as by a curette, when the sponge is removed.

The withdrawal of the sponge leaves a gaping bleeding cavity, which should be washed out with a carbolized solution or mopped out with an applicator and cotton soaked in carbolized glycerine. The procedure for which the canal was dilated (digital examination of the uterine cavity, intra-uterine application, curetting of the cavity, division of the capsule of a fibroid tumor, removal of a polypus), may then be at once undertaken; or, if the sponge was introduced as a therapeutic measure in itself, nothing further is done. The uterine cavity and vagina having been thoroughly cleansed and disinfected, carbolized glycerine tampons are again introduced if a watery drain is desired, and the patient is again put

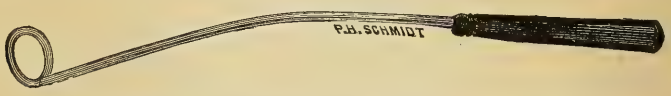


FIG. 126.—Sass' Counter-pressure Loop for Removal of Dilated Tents.

to bed, where prudence dictates that she should stay for at least another twenty-four hours. The dangerous results of the sponge-tent usually follow within twenty-four hours after its removal; due caution should therefore be exercised by the physician and impressed upon the patient. All exposure to cold and excitement for several days should be carefully avoided, and frequent cleansing injections should be employed.

An anesthetic is seldom needed either for the introduction or removal of the tent. But an opiate is usually required during the dilating period. Abdominal pain, of a grinding, expulsive nature, is usually felt, in proportion to the size of the sponge and the elasticity of the tissues, and I have even seen nausea and vomiting (reflex), chills, and slight collapse occur at the height of the distention. Such symptoms need not in themselves alarm the physician; but if the patient should have repeated chills, or the pain resist a fair quantity of opium (best given in suppositories), the immediate removal of the tent is called for, especially as the severity of these symptoms shows that it has done its duty, so far, at least, as dilatation is concerned. If it is intended to perform some of the operations above mentioned immediately after removing the tent, it is advisable to anesthetize the patient before proceeding to remove it, in order to have no delay afterward.

A tent should *always* be introduced at the house of the patient, *never* in the physician's office. The latter practice, although frequently followed, is always hazardous, and any accidents which chance to ensue should very properly be laid to the fault of the physician. It is little short of

criminal carelessness and audacity to trifle in this manner with so dangerous an instrument as the sponge-tent, or, for that matter, *any* dilating tent.

Quite as important as this rule is that, not to follow one sponge-tent immediately by another. It has been stated that in removing the tent more or less uterine mucous membrane is removed with it, and that therefore a raw, abraded surface remains. Now, it is a matter of experience that a freshly denuded surface absorbs septic germs much more rapidly than one covered with granulations. And this is the reason why it is always advisable to wait a few days until granulations have formed in the cervix before repeating the tent. If immediate dilatation is still required the finger may be tried, or a steel or sound-dilator, or one of the non-infecting gradual dilators (laminaria and tupelo), yet to be described, should be inserted. For this same reason a sponge-tent should *never* be employed immediately after a cutting operation on the cervix or uterine body. I am aware that this rule has often been violated, but its violation has cost a certain number of victims, and the profession are now of one accord in condemning the repeated introduction of sponge-tents. Some authors even go so far as to proscribe them entirely. This, I think, is going a little too far. Deaths from a single sponge-tent have been reported by Thomas, Goodell, Olshausen, Hildebrand, Winckel, Aitken, Lusk, Janvrin, and quite a number of others. Only recently a physician of this city (a specialist) lost a patient by metro-peritonitis, which came on immediately after the removal of a sponge-tent. That such accidents can happen to experts proves only that the agent is a dangerous one, and that every possible precaution should be taken when circumstances compel its employment. When another agent will do as well, it certainly is far safer not to choose the sponge.

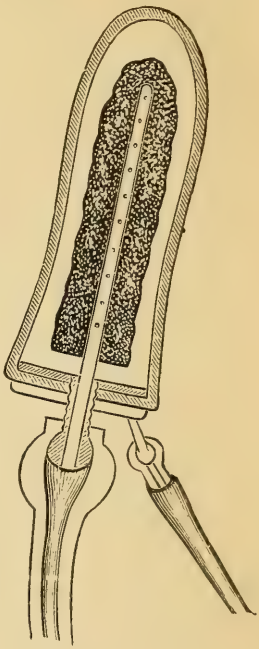


FIG. 127.—Emmet's Sponge Dilator.

To avoid this danger of septic infection, several ingenious contrivances have been proposed. Thus, the tent is enveloped in goldbeater's skin, the base being left uncovered. When introduced the base projects from the os, and the sponge is expanded by water injected into the vagina, and by glycerine and water tampons placed over the cervix. Or the whole tent is covered, fluid being admitted to the tent through minute holes pricked in the skin at the base. Or thin gutta-percha or rubber cloth is used instead of the goldbeater's skin. Emmet has constructed a sponge-dilator shown in Fig. 127. "Through a disk of hard rubber passes a brass tube, which is perforated by a number of small holes, and open at each extremity. This tube is passed through the centre of a sponge-tent of suit-

able size, the whole being covered by a thin india-rubber cot or bag, of which the mouth is stretched over the edges of the disk, and the free edge of the cot, which has been drawn over the disk, is then secured between the under side of the disk and the brass plate. The plate has attached to it, on one side, a knob which can be grasped by a pair of forceps, the blades of which are closed by sliding forward the canula. When the knob is held by the forceps, a ball-and-socket joint is formed, which will admit of motion in any direction. Over the bulb is slipped a piece of india-rubber tubing, a foot or more in length, through which water is introduced for swelling up the tent, and at the end of the tube is a stopcock. To the other side of the stopcock a Davidson syringe may be attached, or, what is better, a thin india-rubber bag, such as are used for pessaries, with tube and stopcock. The dilator is introduced by steadying the cervix with a tenaculum in one hand, and by holding the forceps and tubing in the other hand, the proper direction can be given to the instrument. When it has been introduced within the canal to the proper depth, a small amount of water is to be thrown in before removing the forceps. As the tube in the centre of the sponge is open at its extremity and its sides perforated, the water will make its exit at the upper portion, and dilatation will extend from above downward, so that the instrument cannot slip out. The sponge is sufficiently dilated in a few moments to cause it to be retained, and the forceps may then be removed by sliding back the canula. The patient is told to lie on her back in bed, and to place on her abdomen an air-bag containing water, which is made to flow into the dilator by occasionally compressing the bag with the hands." The dilator is generally retained twelve hours, unless more rapid dilatation is desired. By opening the stopcock the water is drained off from the sponge, and the dilator is then withdrawn by seizing it with forceps by the knob, and pushing back the uterus with the finger of the other hand. The disadvantage of this instrument is that it requires an already moderately dilated canal to allow its introduction.

These contrivances certainly look very useful and plausible; but I do not believe they have become popular as yet, chiefly because we have of late obtained a substitute for the sponge in the tupelo-root, to be described presently.

The *counter-indications* to the use of sponge-tents are therefore such as are common to all applications to the uterus, viz., acute, subacute, or recent chronic inflammatory conditions of the uterus or adnexa, and pregnancy; and such as are special to sponge-tents, viz.: a fresh wound or raw surface in the endometrium, and a hyperemic, readily absorbent condition of the tissues, as during abortion.

The *dangers* arising from the use of sponge-tents in any case have already been referred to, viz.: metro-peritonitis, cellulitis, septic infection, and death. Considering the recklessness with which this agent has been employed for many years, and its universal use by general practitioners and all who dabble in gynecology, it is greatly to be wondered that the accidents and deaths from it have not been more frequent. Surely, a

special Providence reigns over the female sex in this as in very many other manipulations to which their reproductive organs are subjected! Be it understood, then, that it is not the dilating property of the sponge-tent which is dangerous, but the decomposition of the fluids it has imbibed, and their absorption through the abraded surface left after the removal of the tent. The peculiar porous character of the sponge favors both this decomposition and the abrasion in a far greater degree than the other absorbent dilators.

The *precautions* to be observed, therefore, in using sponge-tents are: 1, *always* to introduce them at the house of the patient, and keep her in bed while the tent is retained, and for at least twenty-four hours after; 2, *never* to insert a second sponge-tent *immediately* after the first, but adopt other means of increasing the dilatation, if it is still needed, or defer the second tent for several days until granulations have formed in the endometrium; 3, *never* to introduce a sponge-tent against a freshly wounded surface, as after discission of the external or internal os, or operations in the uterine cavity; 4, never to use a sponge-tent when there is evidence of previous inflammation in or about the uterus, or pregnancy exists or is suspected, or an abortion is in progress or has recently taken place; 5, never to leave a sponge-tent in the uterus longer than twelve hours; 6, always to disinfect the tent thoroughly immediately before inserting it, and the vagina and uterine cavity after its removal; 7, to use a tent which will readily pass through the internal os at the first attempt; 8, to treat the procedure as an operation, possibly productive of serious consequences.

Laminaria Tents.—These tents were introduced into practice by Sir James Simpson, G. J. Wilson, and Carl Braun, about the year 1863, and are made from the root of the laminaria digitata, or sea-tangle, by removing the bark and turning them on a lathe until their surface is entirely smooth and uniform. They come in sizes varying from that of a knitting-needle to that of a lead-pencil, laminaria tents of a larger size than the latter being rare because the plant seldom grows thicker. The tents are made about two inches long, rounded at either end, and of uniform thickness throughout, not conical like the sponge-tents. They come either solid, or perforated through their length, a modification recommended by Greenhalgh in order to increase their surface of absorption and thereby their expansion. Through one end of the tent is drilled a hole, in which a cord is fastened for the removal of the tent. The best laminaria tents come from England.

The material is exceedingly hard and almost incapable of being cut by a knife. I have broken the blade of my pocketknife in the attempt to whittle down a laminaria tent. A file alone will make an impression. This exceeding density entails a comparatively slow and limited absorption and expansion, as compared with the sponge-tent. While the latter will dilate within a few minutes almost to three times its compressed size, the laminaria will barely double its diameter in the course of several hours. According to experiments made by Cohn, a laminaria tent, 55 mm. long,

increased in length by only 6 mm. in twenty-four hours, but expanded from 24 mm. to 42 mm. The increase in length is, therefore, but slight, that in thickness not quite one hundred per cent. In accordance with the density of the laminaria and its slowness of expansion, is the force with which it expands. Matthews Duncan states that his experiments show that the laminaria expands with a force of five hundred to six hundred pounds to the square inch. The walls of a uterine canal, therefore, which would yield but little to a sponge-tent, will be slowly but steadily forced apart by the laminaria. The peculiar imbibition and softening of the tissues produced by the sponge is, however, much less marked with laminaria. The action of the sponge is, therefore, although more rapid, rather less painful and forcible than that of the laminaria. The soft, succulent tissues dilate more easily.

The hollow laminaria tents swell more rapidly and thoroughly than the solid ones, but not as forcibly, because the thin walls are easily compressed by the dense uterine canal. It is, therefore, questionable whether the perforation of the tent is really an improvement. The greater expansion is more or less outweighed by a diminution of resistance and increased compressibility.

The limited size of the laminaria tents, the largest when fully expanded not exceeding the thickness of the little finger, is an objection which can be overcome by inserting several tents side by side, one after the other, or a bunch of small tents held together by a rubber band. This is exceedingly plausible in theory, but by no means so easily carried out, as any one will confirm who has tried to introduce a second tent beside the first, which is constantly slipping out of the cervix as soon as the pressure upon it by forceps or tent-applicator is removed. And to introduce a bunch of tents requires a patulous canal, free from rugæ and pockets, in every one of which the point of one of the tents is liable to catch. However, practice makes perfect, and Atthill constantly applies tents in this manner, and is very well satisfied with it.

The laminaria tent, being constructed from a salt-water plant, contains a large quantity of salt, which is distinctly recognizable by the taste. When a laminaria tent is expanded, its smooth cylindrical surface is lost, and it becomes rough, with sharp edges extending along its long diameter, and appears twisted on itself (Fig. 129). This is due to the peculiar twisted condition of the fibres of the plant, which is not apparent when the surface is smoothly turned. Curiously, when the rough, unpolished root is swelled in water, its surface becomes round and smooth, because the inequalities in the surface are equalized by the swelling. When it is turned these compensating inequalities are removed, and therefore the surface becomes rough.

A laminaria tent is very liable to expand unequally in the uterine cavity, the portions in the cervical canal and uterine cavity proper swelling to their utmost limit, and the spot corresponding to the narrow internal os remaining comparatively unexpanded. The tent then assumes the shape of the cervical and uterine cavity, as shown in Fig. 130. Naturally the

removal of a tent expanded in this manner is difficult, because the expanded upper part of the tent must be forcibly drawn through the narrow internal os, as shown by the unexpanded isthmus. Besides, if the tent should have been inserted entirely within the external os, which it is often necessary to do to prevent its slipping out before a tampon can be applied to retain it, the external os will close over the tent, and further difficulty be experienced in obtaining a firm grasp and removing it.

FIG. 128.—Laminaria Tents, Straight and Curved (P. F. M.).

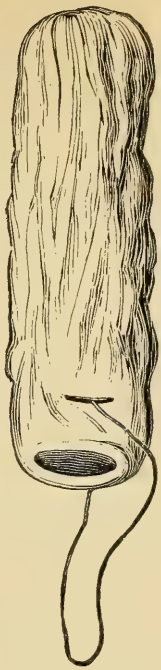


FIG. 129.—Laminaria Tent Dilated in Water (P. F. M.).

FIG. 130.—Laminaria Tent Dilated in Utero, showing Constriction by Internal Os (P. F. M.).

By placing a laminaria tent in warm water for a few minutes it becomes slightly softer and can be bent so as to conform to the natural curve of the uterine canal, retaining the shape when hard. This curve often greatly facilitates its introduction.

Manner of Introduction.—A laminaria tent may be introduced in very much the same manner as a sponge-tent, either on the finger or through a speculum. The speculum is always advisable, because a tampon is at once required over the cervix to retain the tent. If the tent is hollow it may be impaled on a Sims thick slide-applicator, or stout metal applicator, if solid, it is seized in the forceps and carried into the uterine canal. The outer hand will greatly aid the passage through the internal os. It is, as a rule, much easier to introduce a laminaria than a sponge tent, because

its smooth surface and slow absorption and its uniform size offer no obstacles. But this very smoothness renders the retention of the tent more difficult, and it often requires quite a deal of trouble and ingenuity to retain the tent until a tampon can be placed over the os. By holding it within the external os with the forceps or the left index-finger, until the tampon can be seized and placed over the cervix, or a second tent can be grasped and passed beside the first, and then securing both with the index or forceps, and so on, this annoying gliding out of the tents may be avoided. It is not advisable to push the tents up to the fundus and thus insure their retention, because it would probably be very difficult to remove them after expansion, and the uterine cavity would be unnecessarily irritated. It is the uterine canal, up to a short distance above the internal os, which we wish to dilate, not the region of the orifices of the Fallopian tubes.

If there is any obstruction at the internal os, the cervix, which of course has all along been steadied with the tenaculum in the anterior lip, is drawn well down, and the left index-finger gently presses the tent upward, in place of the applicator. By gently manipulating the point of the tent, as of a sound, it may often be guided past the obstruction. Of course, the rule of not choosing too large a tent applies here, as well as to sponge-tents, and the tupelo, still to be described.

One tampon will not suffice to fix the tent, unless it chances not to show any tendency to escape. It is generally best to pack the vaginal vault pretty tightly with several tampons.

In order to obtain the utmost expansion of a laminaria tent, it should be left in utero at least eighteen hours. I generally leave them in overnight, keeping the patient in bed, and usually also slightly under morphine until the forenoon of the next day. Expansion does not commence as rapidly as with sponge-tents, nor does it reach its limit so soon. The laminaria dilates more slowly, but with unsparing persistency, and the pain is generally more severe, especially in cases of constricted internal os. I have seen decidedly more temporary reaction (reflex nausea, vomiting, and shock) during laminaria dilatation, than with sponge-tents. It is therefore quite as important to observe every precaution against inflammation, even though laminaria does not possess the pernicious quality of favoring decomposition of the fluids absorbed by it.

The laminaria is also removed through the speculum, the end projecting from the cervix being seized in stout forceps, and counter-pressure against the cervix being exercised by the finger or instrument already described. By a twisting, half rotary movement, the tent is then loosened from the grasp of the uterus, and removed. The almost invariable greater expansion of its internal end, over the middle portion, renders this act quite difficult, and the dragging of the rough tent through the (in spite of the dilatation) still narrow internal os, gives rise to injury and hemorrhage from that point. This cannot be avoided, and the abrasion is always less than that from a sponge-tent. After removal of the tent, the uterus and vagina are cleansed, and the patient returned to her bed under the same

precautions as described after sponge-tents. I am in the habit, after the removal of any form of tent, of passing a cotton-wrapped applicator saturated with pure carbolic acid or carbolic and glycerine into the uterine cavity, as an additional precaution against infection. It very seldom happens that an expanded laminaria tent becomes so soft through long maceration, as to be torn in pieces during removal. With sponge-tents this is by no means an uncommon occurrence.

Professor B. S. Schultze, of Jena, Germany, has lately described a new method of dilating the uterus with laminaria tents, which is characterized chiefly by exceeding care in disinfecting vagina, tents, and uterine cavity, by carbolic applications during the whole process, and by never allowing a tent to come in contact with a fresh wound. His method is briefly as follows: The direction and calibre of the uterine canal is first ascertained by careful probing with graduated probes of soft metal, bent as nearly as possible to the curve of the canal, as suspected by bimanual examination. If a drop of blood follows the probing, showing an injury to the mucous membrane, the laminaria introduction is deferred twenty-four hours. The cervix is exposed by a duckbill speculum, applied in knee-chest position, the uterus drawn down by a tenaculum, and again probed. If blood follows, there is another delay of twenty-four hours and then a repetition of the steps already stated. The vagina is cleansed by cotton wads soaked in a three per cent. solution of carbolic acid, in which all the instruments (previously steeped in boiling water) are kept. A laminaria tent, corresponding in length and size to the uterine canal, is now dipped for a moment in boiling carbolized water, and then bent to the proper curve, as ascertained by the probe, and hardened in cold water, also carbolized. With forceps the tent is now gently inserted into the uterine canal, carefully following its curve. If any bleeding occurs, the operation is deferred twenty-four hours. If the tent meets with an obstacle which is not easily overcome, the probe is used. When the tent is *in situ*, a tampon of salicylated cotton, soaked in carbolic solution, is placed over the cervix, then several glycerine tampons; tenaculum and speculum are removed, and the patient is placed on her side, and put to bed, where she remains in perfect quiet for several hours. Abdominal pain is relieved by hot-water compresses. In from six to eight hours the tent has fully expanded, but it may be left in utero for twelve to sixteen hours. It is removed precisely in the same position as it was introduced, the tent being very carefully withdrawn to prevent injury. The canal is then measured again with thicker, flexible probes, and if it has reached a width of 7 mm. above the os internum, which is generally the case with an original calibre of 4 to 5 mm. after one dilatation, the introduction of a flexible metal catheter of a diameter of 6 mm. is feasible, through which the uterine cavity is irrigated with one-fourth to one-half pint of a two to three per cent. carbolized solution of about 100° F. Any fluid medicinal application may now also be made. The catheter should also have the curve of the uterine canal. The propelling power of the water is the ordinary fountain irrigator. If further dilatation is desired, a second larger laminaria tent is inserted after the irrigation, which is

retained and removed in the same manner, and may be followed by a third and fourth if necessary, or by two at a time. In normally located or anteverted or anteflexed uteri, the knee-breast position is the best; for retrodisplacements the gluteo-dorsal. In thirty-six hours a virgin uterus can be opened up to the fundus for the exploring-finger.

Schultze reports having applied the laminaria in this manner over a thousand times, and that he observed pelvic cellulitis in but five cases after this procedure, and the diagnostic and therapeutic measures which were required. In hyperplasia and subinvolution of the uterus, repeated forcible dilatation with a diverging steel dilator proved very beneficial in promoting absorption and involution.

Tupelo Tents.—The disadvantages inherent to the two agents for gradual dilatation just described—of sponge-tents, the danger; of laminaria, the small size and unequal expansion—these disadvantages led the profession to seek for a substance which, while it would not favor decomposition of fluids, would absorb them rapidly and thoroughly, and could be procured in sizes sufficient for more thorough dilatation than the laminaria. Such an agent should possess the range of size, the rapid and equable expansion, and the softness of texture of the sponge-tent, and the comparative safety of the laminaria. This substance has been found within the past few years in the root of the nyssa aquatica, or tupelo-tree of the Southern States. This root comes in sizes as thick as a man's wrist. It is so soft as to be easily cut to any shape or size desired with the penknife; it is capable of a great degree of compression; it absorbs fluids rapidly, and expands to at least double its compressed size; when expanded its surface is, although not perfectly smooth, not sufficiently rough to injure the mucous membrane during its removal; it does not favor decomposition of fluids, indeed, I have never found a tupelo tent to possess the slightest offensive odor after having been left in utero over twelve hours. The rapidity of expansion of the tupelo almost equals that of the sponge tent; therefore, it can be used when the dilatation and the diagnostic or therapeutic purpose for which it was made admit of as little delay as possible. Tupelo tents are now made of all sizes, from a knitting-needle to a thumb, and of any desired length. They can be procured larger, but so far no use has been found for larger sizes. The usual length is like that of laminaria, two inches. They are prepared by subjecting the root to excessive pressure in a machine under dry heat. The surface is smooth, although not polished, and they are therefore far less likely to slip out of the cervix than the laminaria. Besides, after having been used once, they can be cleaned, disinfected, compressed, and again used as though they were new. This can scarcely be done with sponge or laminaria tents, at least the trouble is greater than the gain.

An additional advantage which the tupelo tent has over the laminaria, besides its size, and in which it resembles the sponge, is that it softens the tissues and renders them more succulent and dilatable. The dilatation of tupelo, when very thoroughly compressed, is at least one hundred per cent., and usually very uniform, the ring of constriction indicating the in-

ternal os being much less marked than in laminaria. The sponge-tent also shows this constriction in marked cases. The degree of expansion of a set of five tupelo tents is illustrated by the following diagram, the dotted outline of each tent showing its expansion.

The large size and safety of the tupelo tents render them available in cases where the danger of septic infection has led us to dread sponge-tents and to substitute soft rubber dilators with but imperfect success, viz., constricted cervical canal in abortion, and premature labor, cases in which the small size of the laminaria tents renders them useful. I have repeatedly employed the large tupelo tents in abortion to hasten the expulsion of the ovum, or permit the manual removal of the placenta, with

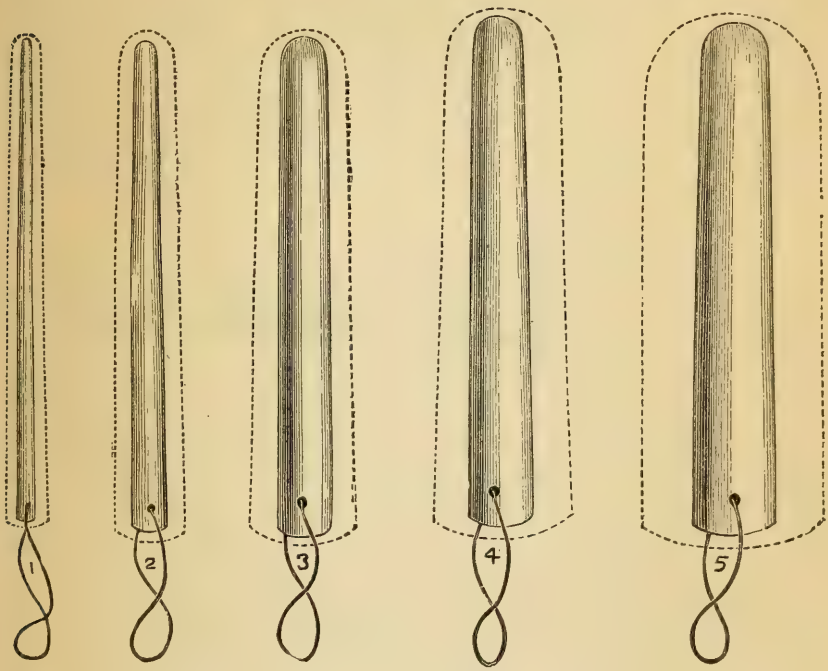


Fig. 131.—Degree of Expansion of Tupelo Tents (P. F. M.).

great satisfaction. In a couple of hours the tent had dilated the cervix sufficiently for my purpose. In stenosis of the vagina, where septic infection is also to be feared, the large tupelo tents expand the canal to the desired size, so also in stricture of the rectum.

In fact, whenever thorough, rapid, and safe dilatation by gradual methods is desired, the tupelo tent is the agent to be chosen. In only one particular has it as yet failed to supplant the sponge-tent, viz. : in the irritating, stimulating, and softening effect which the latter has on the surrounding tissues, a property of great value in subinvolution, hyperplasia, and atrophy of the uterus.

The *method of introducing* the tupelo tent is precisely identical with that

of the laminaria, except that the tent being solid, it must be seized with the forceps instead of being impaled on an applicator. It is dipped in vaseline and introduced, the same precaution having been taken not to choose too large a tent. A tampon is also best placed over the cervix. Accordingly as a rapid conclusion is desired, or a more thorough dilating effect intended, the tent may be removed in two or three hours, or left in for twelve to eighteen hours. Longer than the latter period would scarcely ever be necessary or useful, and I have even found one hour sufficient to produce a dilatation of requisite size to permit thorough curetting of the uterine canal. It is wise to use the same precautions after tupelo as after other tents.

One of the great advantages of the tupelo tent is, that if it has been found impossible to force the tent chosen for the case through the cervical canal, it need not be thrown away like the sponge-tent (which has become expanded and rough) or laid aside for another smaller size, like the laminaria (which smaller size may not be at hand, and cannot be at once prepared, as the laminaria is too hard for whittling)—but can be whittled down in a moment with a penknife to the required size.

FIG. 132.—Tupelo Tent No. 3, after Eighteen Hours' Dilatation in Utero, showing Slight Constriction Produced by Internal Os (P. F. M.).

Another advantage is that the tupelo can be introduced immediately after a fresh incision has been made (as after dividing the internal os), because it does not favor septic absorption. And as many tupelo tents can be inserted, one after the other, as may be desired, for the same reason. This property, to be sure, belongs to the laminaria also.

Tents and bougies made from the bark of the *slippery-elm tree* have been used by some gynecologists. Dr. Byford, of Chicago, highly recommends these tents for their mildly dilating and safe qualities in flexions of the uterus, and bougies of the root in different sizes have been introduced to the profession by Dr. Skene, of Brooklyn, for use in constriction and tortuosity of the uterine canal. The glutinous property of the slippery-elm renders these tents almost innocuous, while their repeated introduction gradually relaxes the uterine fibre, and produces moderate dilatation.

Tents made of the *compressed pith of the corn-stalk* have been recommended by Dr. Goldsmith, of Georgia, and, I am told by gentlemen who have had occasion to use them, form an efficient substitute for the more powerfully dilating tents, when the latter do not happen to be at hand. The same may be said of the tents of compressed elder pith.

The use of tents made from the *root of the gentian* plant (I believe first introduced by Winckel, of Dresden) has not become popular. If it is de-

sired to impregnate the tent with some medicinal agent, according to Chrobak, the slow and mild dilating property of the gentian renders these tents especially available.

Indications for Dilatation of the Uterus.

The indications for dilating the uterine canal by one or more of the foregoing methods consist either in conditions which interfere with the exit of fluids or solid bodies from, or the entrance of fluids or instruments into the uterine cavity; or in affections which require the dilatation as a therapeutic measure in itself.

1. Conditions of the first variety—*Interference with the exit of fluids or solid bodies from the uterine cavity*—are: Constriction of the uterine canal (stenosis, flexion, rigidity). The fluids which are thus prevented from escaping are comprised in one, the menstrual blood. The solids which may be retained are fibroid tumors, the immature or full-grown fetus, the placenta.

2. Conditions of the second variety—*Interference with the entrance of fluids or instruments into the uterine cavity*—are also: Constriction of the uterine canal, from the same causes. The fluid which is prevented from entering is the seminal fluid; the instruments, are the sound, applicators, curette, forceps, syringe, endoscope, the finger.

The diseases, therefore, in which dilatation may be required, are: organic constriction of the uterine canal, flexion (chiefly anteflexion), dysmenorrhea, sterility, all conditions of the endometrium which require the free application of medicinal agents to that part (endotrachelitis, hemorrhage, endometritis, vegetations, malignant disease, hyperplasia, subinvolution).

3. The conditions in which dilatation is required *as a therapeutic measure in itself* are areolar hyperplasia and subinvolution; again, atrophy of the uterus; neuralgic or spasmodic dysmenorrhea, not dependent on organic constriction; endotrachelitis, with cystic hyperplasia.

Special Indications for each Method of Dilatation.—To a certain extent the purposes for which each of the foregoing methods of dilatation is specially indicated have been pointed out in the description of the method. As a general rule, where repeated *rapid dilatation* of an entirely *undilated uterine canal* is desired, the graduated sounds and steel divergent dilators are preferable.

Where *rapid dilatation* of an already *somewhat dilated* canal is intended, the inflatable rubber tubes of Molesworth are the best instruments. The dilatation in such cases probably does not need frequent repetition.

In *gradual dilatation* of an *undilated canal*, tupelo, laminaria, sponge. Frequent repetition is also unusual.

In *gradual dilatation* of a *somewhat dilated* canal, tupelo (larger sizes), sponge, Emmet's water dilator. Also not likely to be frequently repeated in the same case.

Further, where *moderate dilatation* is desired, sounds, divergent dilators, small tupelo, laminaria, and sponge-tents.

For *thorough dilatation*, large tupelo and sponge-tents, Molesworth's and Emmet's water dilators.

Rapid repeated dilatation of an entirely undilated uterine canal is generally indicated in *dysmenorrhea and sterility.* Either the graduated sounds or the divergent dilators may be used, in the manner fully described under each head. I most decidedly prefer the divergent dilators, and have seen excellent results from their frequent and careful employment.

In dysmenorrhea from constriction of the canal or flexion, a few sittings, say two a week for a couple of months, one dilatation being practised immediately before the expected period, will generally result in decided improvement or cure. Whether this is due to the removal of a mechanical obstruction (Emmet does not believe in "obstructive dysmenorrhea") or to the distention of spasmodically contracted muscular fibres at the internal os (practically a mechanical obstacle), a spasmodic stricture—I will not attempt to decide. That the dilatation does good in these cases I have frequently seen. They are usually cases of young unmarried women, or of nulliparæ, in whom more or less anteflexion is found to be the only pathological feature about the uterus, which readily admits the sound. The straightening of the canal by the sound sometimes relieves the menstrual pain, but this result is much more certain after thorough dilatation. I have even seen one dilatation relieve a dysmenorrhea of eleven years' standing in a case of sterility depending on a sharp anteflexion. The treatment may need to be repeated once or twice during several intermenstrual periods, before achieving permanent relief.

In sterility, the treatment requires to be much more persistent and thorough than in dysmenorrhea. My practice in those cases in which the sterility, evidently, or so far as examination shows, depends on torsion or constriction of the uterine canal, or on a conical cervix, or on an excessive rugosity of the endotrachelian mucous membrane, has been, first, to dilate the canal thoroughly, perhaps even incise the external os, as described under Applications to the Cervix; and then to maintain the patency of the canal by the weekly passage of a medium-sized dilator for a couple of months. As soon as the canal appears permanently open, I tell the patient to report after every menstrual period, or its date if it fails to appear. In the latter case, the chance is that the treatment has proved successful. If, however, impregnation has not yet taken place, as shown by the return of menstruation, I proceed to dilate the canal again moderately, tell the patient to use a cleansing borax or phosphate of soda injection every evening (to neutralize any excessive acidity of the vaginal secretion, which is injurious to the spermatozoa), and to practise coition that night and every night for a week subsequently. By repeating this process month after month, a successful result was ultimately obtained in a certain proportion of cases, although I must confess that the number of cases in which impregnation finally took place was but small in proportion to the whole number of cases of sterility. Still, this may have been partly due to the want of

perseverance of many of the patients, and to causes not removable by dilatation. In one case the patient, who had been married eight years without becoming pregnant, the sterility doubtless being due to a long conical cervix and narrow external os, did not conceive until five months after the treatment by dilatation (laminaria twice and subsequent divergent dilators several times) had been entirely suspended. Dr. Godson, of London, has recently (London Obst. Soc.) reported five cases of dysmenorrhea and sterility of several years standing, in which repeated dilatation by graduated metallic bougies not only cured the menstrual pain, but was also speedily followed by conception. In the discussion, a number of gentlemen reported frequent cures of dysmenorrhea and sterility by similar rapid dilatation of the uterus, Dr. Graily Hewitt using a divergent steel two-branched dilator, Drs. Carter, Galabin, and others, graduated bougies. Dr. Godson's practice was to obtain the greatest possible dilatation at each sitting by gradual insertion of larger bougies.

This rapid dilatation may also be practised when an application is to be made to the endometrium. The divergent dilator is the best instrument for this purpose also.

Drs. Ball, of Brooklyn, Goodell and Ellwood Wilson, of Philadelphia, Hanks and Watts, of New York, have reported exceedingly satisfactory results in dysmenorrhea and sterility depending on constriction of the uterine canal and flexions, chiefly those of a congenital character, by forcibly dilating the uterus under ether with sounds or divergent dilators to the utmost limit, keeping up the dilatation for fifteen to thirty minutes or longer, and repeating it, if necessary, every month or oftener. The patient, of course, is kept in bed and treated as she would be after any operation on the genital organs, which indeed this maneuvre is. Dr. Ball even introduces a large hard-rubber plug into the dilated uterus immediately after removing the dilator, and has this plug worn for a week or more, during which time the patient is kept in bed. All these gentlemen unite in praising the slight reaction following this treatment. Still, one case of death from peritonitis due to it is reported by Dr. Watts. It certainly looks and sounds very plausible, although some prominent gynecologists pronounce this forcible hyper-dilatation of the uterus a barbarous practice. It seems to me particularly applicable and justifiable in slender, anteflexed uteri with long, conical cervix, when no counter-indication exists and the patient is unwilling or financially unable to submit to the systematic protracted course of gradual dilatation described by Schultze, or the frequent moderate rapid dilatation with divergent instruments. The latter method certainly is too mild and incomplete in very many of the cases in which the peculiar shape and direction of the uterine canal and the dense character of the uterine tissue requires thorough dilatation.

Rapid dilatation of an already somewhat dilated canal may be called for when a fibroid polypus or a placenta after abortion is to be rapidly removed because the decomposition of the foreign body has begun. Or, violent uterine hemorrhage may require the immediate thorough dilata-

tion of the canal for the removal of the cause (placenta or vegetations by curette) and the application of styptics or the uterine tampon, or a sloughing uterine tumor (fibroid or malignant) calls for thorough disinfectant irrigation of the cavity. These indications are fulfilled exceedingly well by the tubes of Molesworth's instrument, size after size of which may be used at one sitting until the expansion is sufficient. The dilatation is greatly facilitated by the softness and serous imbibition of the tissues generally to be found in such cases.

Gradual dilatation of an undilated canal is practised in the same conditions as rapid dilatation, but the difference is that the effect obtained from the gradual method is more permanent and thorough than from the rapid. In dysmenorrhea, and chiefly in sterility, if the repeated rapid method fails, the canal may be thoroughly dilated by tupelo, laminaria, or sponge tents, either once, or at intervals of one or more months, in order to insure a permanent effect. In the intervals the canal may be kept pervious by mild rapid dilatation. Gradual dilatation may further be practised as a preparatory step to intra-uterine medication, to the introduction of a stem pessary, or the removal of intra-uterine growths.

Gradual dilatation of a somewhat dilated canal may be indicated in the same cases where rapid dilatation by Molesworth's instrument has been recommended, when there is no haste, and a gradual expansion seems safer. Thus we may use the large tupelo-tents in rigidity of the external os and cervical canal in abortion or labor, in constricted vagina, in stricture of the rectum. The sponge-tent, which would dilate quite as well, is decidedly counter-indicated in cases of labor or abortion, where its septic properties are rendered specially dangerous through the great vascularity of the parts during pregnancy.

In a uterus partly dilated by a polypus which is gradually forcing its way down, or by the softening process accompanying long-continued bloody, serous, or purulent discharge, the larger varieties of tents are also useful to complete the dilatation.

All dilating agents which act by absorption of fluids (all the tents, therefore), and the dilatable rubber tubes, can be used as uterine tampons when a sudden arrest of hemorrhage is desired. They may be left in the uterus for various periods, from one hour to twenty-four hours, according to rules already given and the necessity of the case.

Sponge-tents possess *special indications*, through their peculiar property of causing serous imbibition and relaxation of the surrounding tissues, and the stimulant, alterative effect which their presence exerts on torpid and enlarged uteri. They are therefore most beneficial in hyperplasia, subinvolution, and atrophy of the uterus. Another special effect of sponge-tents is the cure of endotrachelitis by the (really involuntary) removal of the hyperplastic glands when the sponge is withdrawn. The fine meshes of the sponge become interlaced with the follicles, which are forcibly torn away when it is removed. The effect of local applications is, of course, greatly enhanced by this abrasion of the cervical mucosa.

A peculiar use for sponge-tents has been described by Spiegelberg,

viz., to diagnose between beginning scirrhous cancer of the cervix and areolar hyperplasia of that part. Both affections are characterized by great density and hardness of tissue, and in order to tell which is the cancer, Spiegelberg recommends introducing a sponge-tent; if the tent fails to soften the cervix and to dilate the canal in the usual manner, he says the case is one of scirrhus. I have no experience with this test, but should certainly recommend it in view of the difficulty of diagnosing cancer of the cervix in its early stage.

A similar stimulant and alterative effect in chronic uterine enlargements, and also in old indurated pelvic peritonitis and cellulitis, is claimed by Schultze for the laminaria employed after his peculiar method. Only when precautions such as those recommended by him are scrupulously observed would the dilatation of the uterus by any means be justifiable in chronic inflammatory conditions of the parametrium.

The *special advantages of each of these dilating agents* have been discussed during the description. I will merely add a brief synopsis of the conditions in which each article is preferable or pre-eminently useful:

Graduated Sounds and Steel Diverging Dilators.—In dysmenorrhea and sterility depending on a constricted, flexed, rugous, uterine canal, where only moderate, temporary dilatation is desired, or where the dilatation is to be frequently repeated. For intra-uterine applications. In all cases where previous preparation is not desired.

Dilatable Rubber Tubes.—In already moderately dilated uterine canals, with soft dilatable walls (uterine discharges, fibroid tumors, abortion, rigid os during labor).

Sponge-tents.—Where stimulation, changes of nutrition, serous discharges, abrasion of the endotrachelium are desired (areolar hyperplasia, subinvolution, atrophy of the uterus, endotrachelitis). For differential diagnosis between cancer and hyperplasia of cervix.

Laminaria.—Where the canal is very narrow or tortuous, or its walls very rigid (flexions, sterility, dysmenorrhea), as an aid to rapid dilatation by sounds, etc., only for occasional use.

Tupelo.—Also where the canal is narrow, or tortuous; further, where thorough, repeated or rapid dilatation is desired; after incision of cervical canal. Where thorough dilatation is intended, and septic infection is specially to be guarded against. Therefore, as a substitute for sponge-tents. In fact, whenever easy, thorough, and safe dilatation is desired. The best absorbent dilator.

Counter-indicaiions and Dangers.

So much has already been said on this subject in the body of this section that it will be necessary to add but a few words here.

The usual counter-indications to all operative interference with the uterus, or to the passage of any instrument into the uterine cavity—present or recent inflammation of the uterus or adnexa—apply even more to uterine dilatation than to any procedure previously discussed. Most to be avoided and guarded is the sponge-tent; least, the tupelo.

The *dangers* are precisely the lighting up of those inflammatory affections which counter-indicate dilatation; besides, septic infection from sponge-tents. I have already spoken of the frequent deaths and accidents

from sponges. Those from laminaria are much less frequent; still, cellulitis occurs far too frequently to be overlooked. I have been so fortunate as never to have had a worse accident, after any form of dilatation, than a subacute ovaritis, but this I have repeatedly seen from laminaria and dilatation with Ellinger's instrument. From sponge-tents, Molesworth, and tupelo I have had no bad results. My good fortune in this respect has been nothing but luck, for in spite of all precautions serious accidents have happened to the most experienced operators. The extreme caution to be always observed with all these manipulations has already been sufficiently dwelt upon.

Although the tupelo is acknowledged to be the safest and most reliable tent, even it may produce pelvic peritonitis, two cases of which were recently reported by Dr. C. C. Lee, of New York. Not the material, but the act of dilatation may therefore be the cause of the inflammatory reaction.

Dilatation with Cutting Instruments (Bloody Dilatation).

The operation consists in dividing the cervix longitudinally either on one side or both, through the anterior or through the posterior lip; or quadrilaterally, crucially. The whole cervix may be divided from orifice to orifice, or only the external or the internal os. The incisions may be deep, extending almost to the vaginal mucous membrane or the peritoneum (the bilateral division of Simpson, and the antero-posterior section of Sims), or they may be superficial, extending only through the cervical mucous membrane (the superficial trachelotomy of Peaslee).

The instruments employed in incising the cervix are either scissors, knives, or two-bladed instruments separated by a mechanism in the handle.

For division of the external os, simple long, straight scissors answer very well; or a long-handled straight or curved bistoury may be passed into the cervix and cut out to any desired depth.

For incision of the remainder of the cervical canal, and chiefly the internal os, a long, straight, slender probe-pointed bistoury is sufficient in many cases; or a movable knife, which can be fixed in a handle at any required angle, may be preferable when a flexion is present. The disadvantage of these one-edged knives is that they need to be turned before the incision in the opposite wall can be made, and that the depth of the incision depends entirely upon the accuracy and steadiness of the operating hand. To avoid this uncertainty, a number of complicated instruments with two blades, cutting in both directions at once, have been devised, all modelled after the original instrument of Simpson. They are called hysterotomes, or metrotomes, and are all introduced closed, opened when the point has passed the internal os and withdrawn open, the knives having been set by the screw at the handle, so as to open only a certain distance. This distance depends upon the amount of division desired, and upon the thickness of the uterine wall. A correct estimate of the depth of the in-

cision, so as to achieve the result wished for, and not to perforate the uterine envelope, constitutes the difficult point in the operation.

An objection to these mechanically acting knives is that the elasticity of the uterine tissue is very liable to deceive the operator into the belief that he has really cut to the depth indicated by the expansion of the blades, whereas the incision was but a superficial one. On the other hand, a knowledge of this possibility may lead the operator to separate the blades too widely, and then by chance too deep an incision may be made. In spite of the convenience of these hysterotomes, the most useful of which are those of Greenhalgh and Stohlmann, the objections named, their expense, and the difficulty in keeping them clean, have led many gynecologists to return to the knife with movable blades. I have often used a long blunt-pointed bistoury, turning the blade to the other side to complete the division, and usually cutting quadrilaterally, until the knife-blade could be easily passed through the internal os. The probe-pointed adjustable knife of Studley has also proved useful in my hands. Peaslee's metrotome is designed to divide only the mucous membrane of the cervical canal, the depth of the incision not exceeding one-fourth of an inch.

FIG. 133.—Studley's Probe-pointed Adjustable Knife for Division of the Internal Os.

The *indications* for discission of the uterine canal (from *discindo*, to cut apart, to sever) are: 1, to open the canal instantaneously for the introduction of instruments or the removal of tumors; 2, constriction and tortuosity of the canal, and the intention to achieve a more permanent patency of the passage than ordinarily results from bloodless dilatation.

Of the first indication little more need be said than that it is confined almost entirely to operations in which the internal os is already more or less dilated by pressure from above (fibroids seeking to escape) and only the lower portion of the cervix and external os require division to allow the foreign body to be extruded. When the cervical canal is split open, the écraseur, knife, scissors, serrated spoon, or vulsellum can readily be introduced and the tumor removed. For the mere application of a medicinal agent no rational operator would think of mutilating the cervix by deep division.

The second class of indications brings us again to the familiar subject of dysmenorrhea and sterility, which I have handled so fully in the section on Bloodless Dilatation. In many cases the latter fails, for the uterine canal has a persistent and perverse tendency to contract again, unless constantly watched, no matter how thorough the dilatation may have been. Therefore, where it is desired to have a thorough, rapid, and permanent effect, the cervix may be divided through its whole length by one of the knives above represented. If the divided canal is kept properly patent, the result of this discission will certainly be much more gratifying than that of mere dilatation. But not only is frequent dilatation necessary for

a considerable period, but also is the operation liable to be followed by serious consequences in the way of inflammation or hemorrhage. It should not, therefore, be lightly undertaken, and as regards dysmenorrhea, I certainly am of opinion that only such cases should be treated by discission in which a portion or the whole of the uterine canal is so contracted as to render proper gradual dilatation impracticable (as in extreme degrees of conoid cervix or cicatricial contraction of external or internal os) or in which repeated dilatation with divergent dilators, tupelo or laminaria tents has proved unavailing.

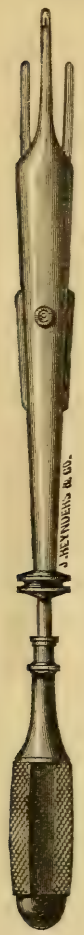


Fig. 134.—Greenhalgh's Metrotome.

As regards sterility, however, it is unquestionable that a fully pervious or patent uterine canal is more favorable for conception than a narrow, tortuous passage. This is proved by the readiness with which women in whom the way has once been opened by the birth of a child, conceive again. In view, therefore, of the great tendency of the uterine canal to contract again after bloodless dilatation and the merely temporary effects of that method, the discission of the canal is certainly indicated and justified in cases of sterility in which no other cause but the narrowness or tortuosity of the canal can be detected, and in which repeated bloodless dilatation has failed. Cases of rigid, almost cartilaginous cervix, and conical pointed cervices with small "pinhole" external os, are, in my opinion, those most requiring and benefited by discission.

Besides actual constriction of the cervical canal due to congenital or acquired stenosis, a relative constriction is produced by flexion of the uterus, either at the internal os or of the cervix. Thus the body of the uterus may be flexed forward, or the cervix upward. Either of these deformities (see Figs. 17 and 18) is a frequent cause of sterility, particularly the latter, and in either the canal needs to be dilated and straightened in order to give the spermatozoa free access to the uterine cavity. The bloodless methods very generally fail in these two malformations; chiefly, in anteflexed cervix a division of the posterior lip of the cervix and formation of a larger and straighter cervical canal is called for.

The division of the external os only is indicated in constriction of that orifice for sterility and the retention of the normal or pathological discharge in the cervical cavity.

In retroflexion it is very rarely indicated to divide either the external or the internal os, because, as a rule, this displacement occurs in parous women whose cervical canals have generally been rendered sufficiently patulous by previous parturition. Besides, we have in the appropriate vaginal pessary a contrivance which lifts up the displaced fundus uteri and straightens the canal. The necessity for discission in anteversion or retroversion does not appear to me (unless the canal be actually constricted)

because the displacement of the cervix backward or forward and the consequent inaccessibility of the external os to the spermatozoa is easily rectified by replacing the uterus and retaining it by one of the numerous and efficient intravaginal supporters. The hypertrophy of the uterine mucous lining by the chronic congestion, so commonly present in these versions, is much more rationally cured by dilatation with one of the swelling dilators (sponge-tent, laminaria, tupelo), or by the curette, or intra-uterine medication, than by division with the knife.

In latero-versions and -flexions, the lip of the cervix corresponding to the fundus may be divided in order to form a straight canal, sterility being the chief (often only) symptom of these displacements. If they are congenital, as is often the case, the operation is indicated; if acquired, *i.e.*, the result of parametritic contraction of the respective broad ligament, it would be unwise to incise, and a proper pessary would be the only (and slight) resource left.

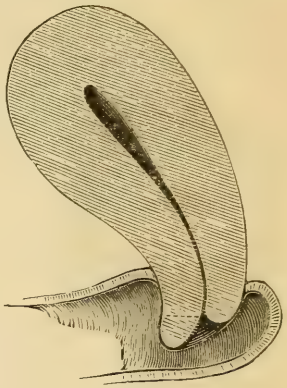


FIG. 125.—Elongation of Anterior Lip of Cervix (P. F. M.).

If the anterior lip of the cervix projects beyond the posterior with the uterus in its normal position of slight anteversion, or in real anteversion, this anterior lip may be divided by one clip of the scissors so as to make a gaping orifice, and remove the obstacle which otherwise this overlapping lip would constitute to the entrance of the spermatozoa. Or the projecting anterior lip may be amputated by the scissors (a slight operation) as shown in Fig. 135. If the lips of the external os have a peculiar valvular shape, as shown in Fig. 153, the obstructing flap or valve may be excised, as shown by the dotted lines in the cut. A straight, slender bistoury is passed about one-fourth to one-half inch into the cervical canal, and a wedge cut out, as indicated.

Another indication for the division of the cervical canal is the hemorrhage caused by sessile uterine fibroids. Baker Brown first practised this method, and its action has been ascribed by him to the division of the circular fibres at the internal os and the consequent contraction of the uterine fibres about the tumor, and by Spiegelberg to the relief of tension of the uterine mucosa and the shrivelling of its blood-vessels. The method is now but little used, having been supplanted by the (both for hemostatic purposes and ultimate recovery) more efficient division of the capsule of the tumor.

VARIETIES OF DIVISION OF THE CERVIX; THEIR TECHNIQUE AND SPECIAL INDICATIONS.

Superficial Division of the External Os.—In endotrachelitis, with a narrow external os and dilated cervical cavity, the retention of the acrid, purulent discharge maintains the catarrh and inevitably entails sterility. It is therefore indicated to enlarge the external os by dilatation or incision,

the latter being decidedly more effectual and permanent. It can be performed with an ordinary bistoury, or better with a long, straight-bladed scissors, care being taken not to cut into the vaginal pouch with the outer blade ; or better still with a metrotome, the blades of which cut on either side on being withdrawn.

There need be no fear of profuse hemorrhage from these incisions, unless they are made unnecessarily deep. A quarter of an inch in each direction will generally suffice to make an orifice quite large enough for all therapeutical and practical purposes. The advantage of making a crucial incision is that the os remains open and its lips do not touch, as is generally the case when only a bilateral incision has been made. The appearance of the os after crucial incision and immediate dilatation with a steel dilator is shown in the accompanying cut (Fig. 136). As soon as the circular fibres of the external os are divided, the cervix retracts and becomes slightly shorter and broader. This is a valuable result in sterility from conical cervix. When the crucial incision has been made, I always introduce a steel two-branched dilator or uterine dressing-forceps, and dilate the orifice thoroughly, rupturing the circular fibres of the cervix and temporarily paralyzing them (as in hyper-distention of the sphincter ani). Having then swabbed out the blood and obtained a view of the endotrachelian mucous membrane, I apply whatever agent (iodine, nitrate of silver, carbolic or nitric acid, curette) appears indicated, and introduce a plug of cotton smeared with vaseline for the purpose both of guarding against any possible secondary hemorrhage, and of keeping the orifice open. This plug is introduced on a Sims slide-applicator (see Fig. 108) up to the internal os, and then left in the cervical canal by pushing it from the applicator by the metal slide shown in the figure. In doing this it is generally well to steady the cervix by a tenaculum hooked into the anterior lip. On removing the tenaculum, care should be taken not to hook out the plug with it. The size of the plug should of course be proportionate to the width of the canal, and it should project but very little from the os, or it is liable to slip out or be wiped out by contact with the vaginal wall. This, however, may be avoided by placing a disk tampon over the cervix. The plug and the tampon both have strings attached to permit their removal by the patient after from twenty-four to thirty-six hours. If the cervix appears particularly vascular, it is well to tampon the vagina more thoroughly and remove the tampons next day, introducing a new supply. The cervical plug should be left in a day or two longer.

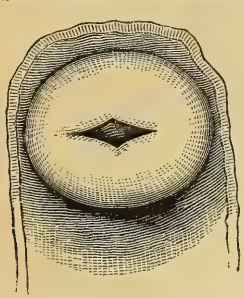


Fig. 136.—External Os Enlarged by Crucial Incision (P. F. M.).

This plugging of the cervical canal may be repeated every other day for a week or two until the canal appears to retain the desired width and any cicatricial contraction following the incisions has been prevented. The plugs may be soaked in any agent chosen for the case—iodine, carbolic acid and glycerine, or impure carbolic acid, being the best agents for this

purpose, and the cure of the catarrh is thus effected, together with the dilatation of the orifice.

I have of late practised a plan first mentioned to me by Professor Fritsch, formerly of Halle, now Spiegelberg's successor at Breslau, which consists in hooking up each little flap of lip between the four shallow incisions in the crucial operation and trimming it off with sharp scissors, so as to leave a smooth-bordered round os; cicatricial contraction is thus almost surely prevented, especially if occasional gentle dilatation is practised until complete cicatrization has taken place (see Figs. 137 and 138).

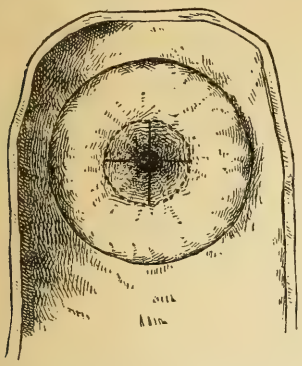


FIG. 137.—External Os with Dotted Lines showing Limits of Flaps to be Trimmed (P. F. M.).

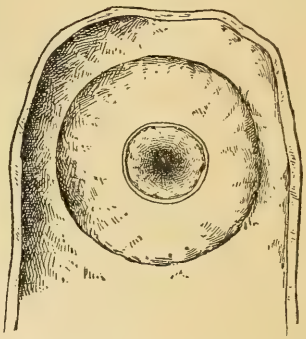


FIG. 138.—External Os showing Funnel Shape after Trimming off of Flaps (P. F. M.).

These incisions of the external os are not dangerous, and accidents, such as hemorrhage, inflammation, or septic infection, very rarely follow them. I am therefore in the habit of performing them at my office or the outdoor clinic. Still, as with all active measures to the uterus, no matter how trifling, it should be borne in mind that an accident may occur when least expected. No reasonable precaution should therefore be neglected.

FREE DIVISION OF THE INTRAVAGINAL PORTION OF THE CERVIX.

This operation consists in incising the portion of the cervix which projects into the vagina up to the vaginal insertion, cutting entirely through the part from the cervical cavity to and through the vaginal mucous membrane covering it. This division may be either bilateral, quadrilateral (crucial), or radiating (five or six incisions, according to Kehrer's method). If more than four incisions are made, the additional cuts will not be carried entirely through the part.

The special indications of this operation are to open the narrow, rigid external os and the lower portion of the cervix for the introduction of the finger, or instruments, or the removal of tumors. In these cases it is generally not necessary to incise the internal os also, because that canal is usually dilated if there be a tumor in the uterine cavity, and if a digital examination or intra-uterine application is merely intended the orifice can be forcibly expanded by the finger or dilators in a few moments. While the circular fibres at the internal os constitute the most constricted and

least yielding portion of the uterine canal, they are nevertheless readily dilated by steady pressure from below if the patency of the lower portion of the cervical canal permits that pressure to be made directly against the contracted spot. In case of need, however, the internal os may also be divided in the manner hereafter to be described.

Some operators prefer this deep division of the cervix to gradual dilatation by tents in all operations for the removal of intra-uterine growths; others condemn it as an unnecessary mutilation. Whenever there is danger in delay (as in hemorrhage from fibroids or malignant growths in the uterine cavity, or when a sloughing fibroid calls for immediate removal) the bloody dilatation seems indicated. When there is no reason for haste, it is a matter of habit and fashion, to a great degree, which method is chosen. Recently Professor Schroeder, of Berlin, has advocated these free incisions for all cases where the uterine cavity is to be thoroughly opened. He claims rapidity and safety for the method, and avoids subsequent mutilation by uniting the lips of the incised wounds by sutures as soon as the indication for which they were made has been fulfilled. The danger of wounding the circular artery which often runs close to the junction of vagina and cervix should be borne in mind. Besides, every such fresh wound is liable to be the channel through which septic germs enter the system.

The operation is performed by exposing the cervix through a Sims or Simon's speculum, seizing it firmly with the tenaculum and drawing it down as near the vulva as feasible. The pointed blade of a straight scissors is then passed into the cervical canal until the other blade almost touches the vaginal roof on one side of the cervix, and the intervening tissues are divided with one sharp stroke. The scissors are now turned to the other side and the operation repeated; and so on with the anterior and posterior lips, if a quadrilateral incision is to be made. If additional shallow incisions are required to open the canal still more, a long blunt-pointed knife is introduced and the cervix divided about half-way through in two or more places. The divided flaps will generally curl out slightly, and readily admit the finger or a steel divergent dilator to complete the dilatation beyond the level of the vaginal insertion.

The hemorrhage is liable to be quite profuse, but will be arrested by the pressure exerted by the dilating finger or instruments. If the canal is to be left open, a carbolized cotton tampon or plug (soaked in a mixture of persulphate of iron and glycerine, and squeezed dry, or, what is equally good and much cleaner, a saturated solution of alum) should be inserted by forceps or on a slide-applicator and the incised canal tightly packed; besides, the hemostatic tamponade of the vagina should be added as a precaution. The vaginal tampons should be removed after twenty-four hours, the cervical plug not until it begins to loosen and come away by itself. Carbolized irrigation of the vaginal and uterine cavity should precede the introduction and follow the removal of these tampons.

This operation, be it understood, is not intended so much as a cure of a stenosis of the cervix, than as a necessary preliminary to operations on the uterine cavity.

Discission of the Cervical Canal.

Bilateral Division (*Simpson's Operation*).—By discission of the cervical canal is meant the division of the whole canal from and through the external, to and through the internal os.

This operation was first performed by Sir James Simpson, and consisted in passing his metrotome through the internal os, opening and rapidly withdrawing it with expanded blades; it was then reintroduced with the cutting edge turned to the opposite side, and the same maneuvre repeated. In this way a uniform division of the internal and external os was effected and the canal made of the same width throughout. By this operation the cervical canal is divided bilaterally, as shown in Fig. 139. To distinguish it from other methods, this operation has been named after its inventor and is known as Simpson's operation for division of the cervix uteri. Simpson was in the habit of performing it in his consulting-room, simply wiping out the incised canal with a brush dipped in a solution of perchloride of iron. As a result, a number of patients had severe hemorrhage and some died of metroperitonitis, but unfortunately no statistics of these operations were ever published. This bilateral incision of the cervical canal is "applicable only to cases in which the intra-vaginal portion of the cervix is normally developed, in which the anterior and posterior segments of the cervix are symmetrical with the os, pointing usually toward the posterior wall of the vagina." (Sims.) It is performed only for constriction of the cervical canal, and the consequences thereof, dysmenorrhea and sterility. Its object is solely to enlarge the canal, to render it patent for the menstrual blood and the seminal fluid.

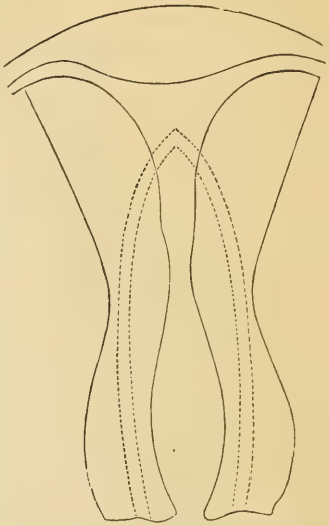


Fig. 139.—Lines of Incision made by Greenhalgh's Metrotome in Bilateral Incision of the Cervical Canal. (Hewitt.)

The degree of constriction of the cervical canal which would call for enlargement by the knife is largely relative, or is a matter of opinion as to the absolute necessity of a patulous canal for the possibility of conception. Peaslee believed that the internal os should be divided when a sound of one-eighth of an inch diameter is unable to pass, and that the external os is too small when its diameter measures but one-sixth of an inch, or less. As a rule, we may assume that a cervical canal which readily permits the passage of a Simpson's sound is sufficiently wide to admit spermatozoa, and allow the menstrual blood to escape. But there are cases in which the sound is readily introduced, although the external os appears very small to the touch and the eye; in these, the lips of the os are generally flabby,

they fall together, and thus quite as effectually close the external os, as though that orifice were really contracted. Again, the sound easily passes through a portion of the canal, and is arrested near, or at the internal os, by rugosities, pockets in the hyperplastic mucous membrane, even though the canal is perfectly straight and quite wide enough to admit the sound, which finally slips over the obstruction and glides into the uterine cavity. But these rugosities may, by dropping together—dovetailing, as it were—present an obstacle to the spermatozoa, if not to the menstrual blood. These two conditions, therefore, may be considered relative indications for discission; they constitute a practical, if not actual, contraction of the canal.

It is therefore well to formulate the indications for discission both on the physical condition of the uterine canal, and the symptoms of obstruction manifested. Thus, even though the external os be apparently large enough, if the cervical cavity be unduly dilated, as by retention of secretion, it is fair to assume that the orifice is relatively too small, and should be enlarged; and so also with the internal os and uterine cavity. I have frequently been compelled, for want of other appreciable causes, to assume that the dysmenorrhea or sterility was due to some obstruction in the uterine canal, although the latter *appeared* large enough; and have then thought myself justified in dilating the canal, simply because that seemed the best manner of overcoming the difficulty.

A peculiar rigid condition of the normally large external os is spoken of by Chrobak as an apparent cause of sterility, and I have made the same observation in women in whom the cervix had been lacerated and the lips of the gaping os were rigid and undilatable through cicatricial induration. It seems as though mere patency of the cervical canal is not sufficient to insure conception; the consistence of the cervical tissues must be favorable to a dilatation of the os under the impulse of sexual excitement, and such a cervix of course does not need incision. The softening, alterative effects of sponge-tents, iodine applications, glycerine tampons, and hot-water injections would restore the elasticity of the os.

A long conical cervix, with narrow external os and elongated uterine canal, may be benefited by combining the bi- or quadrilateral deep incision of the external os with the discission of the internal os. The deep division of the external os causes the lips of the cervix to roll out, and thus shortens the cervix. This shortening may not suffice, however, and the amputation of a portion of the cervix may be required.

The manner of performing this operation—Simpson's bilateral division of the cervix through the whole canal—as modified and improved up to the present time, chiefly by Sims, is as follows: It is not necessary to anesthetize the patient, for the pain is comparatively slight; but as the operation should invariably be done at the home of the patient, it may be as well to put her under ether, if she is at all nervous. The cervix is exposed through Sims' speculum (another will not do as well for this operation), and seized as usual with the tenaculum. The direction of the uterine canal is ascertained by the probe, and the metrotome, with its

blades hidden, is passed up transversely through the internal os. The blades are then opened by the screw or pressure mechanism in the handle (the expansion of the blades and their cutting limit having been previously noted and the screw regulated accordingly) and the instrument is gently withdrawn.

In this country the metrotomes with hidden blades are but little used, but the knife introduced by Sims is almost universally employed. It consists of a stout handle in which several blades of different width and shape are fixed at will by a compression apparatus, as a needle is seized in the needle-holder. The blade to be used is fixed in the handle at an angle corresponding to the direction of the uterine canal, and gently insinuated through the internal os. One side of the cervix is then cut through to the external os ; the knife is now introduced again, and the other side divided. A large Peaslee's sound is now inserted, and the dimension of the canal measured. If it is freely passable for a sound one-fourth of an inch in diameter, the operation may be said to be concluded. If any obstruction is felt, the knife is again introduced and the incisions are deepened. The cuts should be made with a gentle sawing motion. When the incision is sufficiently large, a stout dilator is introduced (Sims preferred his three-bladed, and it probably is the best for this purpose) and the blades are separated until it shows an expansion of one-half to one inch (the limit of the dilator). The cervix should not be drawn down and fixed with the tenaculum, because when the dilator is expanded the uterus will fly away, and the dilator escape from the cervix. It is better to push the dilator up to the fundus, and then gently press the uterus upward with it until the vagina is extended to its greatest length, and make the dilatation. The uterus then cannot escape.

FIG. 140.—Sims' Hard-rubber Plug for Discission of the Cervix.

The canal having been thoroughly dilated, the cervix is seized with the tenaculum, drawn down, and a smooth glass or hard-rubber plug (Fig. 140) introduced to arrest hemorrhage and maintain the canal patent. This plug is two inches long, and is made of different sizes, graduated by the English measure from No. 11 to 19. The large base prevents the plug from slipping into the uterus, and compresses the bleeding wounds at the exposed os. If the canal is not large enough to admit at least the No. 11 plug, it must be incised or dilated still more. Once introduced, the plug is held in position by a tampon soaked in saturated solution of alum and placed directly over the cervix. The vagina is then tamponed in the manner described for hemostasis, the upper layers being soaked in alum water, the lower in carbolized water.

I have used with much satisfaction, after forcibly dilating the uterus with steel divergent dilators for dysmenorrhea and sterility with or without anteflexion, a glass stem with bulbous tip, the device of Dr. W. M. Chamberlain, of New York, leaving it in utero for periods varying from a week to several months.

If the tampon interferes with micturition, or gives pain, the lower layers may be removed after a few hours. The patient is kept in bed, very quiet for forty-eight hours, the urine being drawn with the catheter. She must not sit up in bed or strain, lest the plug be dislodged. The lower layers of the tampon, up to the vaginal vault, may be removed on the third or fourth day, but if the upper layers look compact and fresh they should not be disturbed for two or three days longer. If there is a fetid discharge or rise of temperature, all the tampons should be at once removed, the vagina cleansed with carbolized water, and a carbolized cotton tampon again placed over the plug in the cervix. The plug may be left in until the tenth day, although usually the fifth or sixth day will suffice. The patient remains in bed for ten days, and is then transferred to the sofa; she must not leave her room until the next menstrual period has passed. The bowels should be regulated, after having been kept constipated for several days after the operation. After the first movement it is important to see whether the tampon has been displaced, and if necessary readjust it.

In former years Dr. Sims tamponed the cervical cavity after discission with a cotton plug soaked in the persulphate of iron solution. But this was nasty work, produced coagula, and aided in contracting the canal again. The pressure of the glass or rubber plug is quite as effectual in controlling hemorrhage, more so in keeping the canal open, and much cleaner and neater in every respect.

To remove the tampon layers one by one without displacing the upper layers, which are not to be disturbed, a useful instrument has been devised by Sims, called the tampon-screw (Fig. 97). It is of steel, with a double corkscrew tip, which is screwed into each cotton disk separately, and while the finger of the other hand holds down the bulk of the tampons, the screw removes the disk.

To insure patency of the canal frequent examination is necessary, the finger being thrust gently into the cervix as far as it will reach. Dilatation with sound or dilators may also occasionally be needed.

Antero-posterior Division (Sims' Operation).

The antero-posterior discission of the cervix consists in dividing the intra-vaginal portion in the median line, either anteriorly or posteriorly, or both, and extending the incision upward through the internal os. It is indicated in an entirely different class of cases from the bilateral operation, viz., in cases where the intra-vaginal portion of the cervix is unequally or abnormally shaped, the posterior segment being longer than the anterior, and the body of the uterus anteflexed. The bilateral operation, it will be remembered, is suitable for cases of regular, uniform development of the cervix, without ante- or retroflexion, where the only indication for operation is the narrowness of the uterine canal or the rigidity of the cervix. The so-called conical cervix forms a large contingent of the cases requiring this bilateral operation.

The cases to which the posterior section of Sims is specially adapted are illustrated in the cuts Figs. 141 to 146, taken from Sims.

To perform this operation in a normally developed cervix would be entirely improper and unscientific. These figures represent different degrees of anteflexion, both of the body and of the cervix. The object of the operation—to straighten the uterine canal—is at once apparent from the direction of the dotted lines.

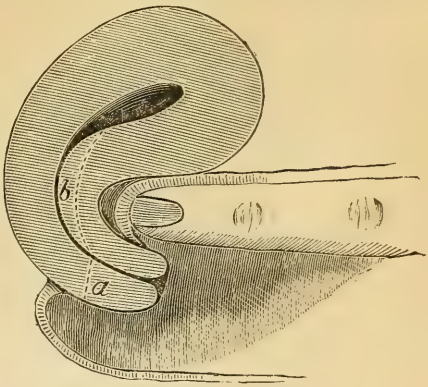


FIG. 141.—Lines of Incision in Anteflexion of the most Marked Degree (Sims).

Dr. Sims lays particular stress on the unequal development of the cervix in these cases, the long, often thick and gristly posterior lip forming a direct obstacle to the ingress of the spermatozoa. The rationale of his plan of dividing the posterior lip and making a large opening to the uterine canal—an opening which, being situated opposite the deepest portion of the posterior vaginal wall, is nearest the pool of semen collected there after coition—is certainly plausible, and has been verified by many successes. That Simpson's operation would not achieve the same result is obvious on comparing the figures. The distinction between these two operations, bilateral and antero-posterior section, has only recently been emphasized by Sims in an article on the Treatment of Stenosis Uteri, published in Vol. III. of the "Transactions of the American Gynecological Society," from which the illustrations credited to Sims

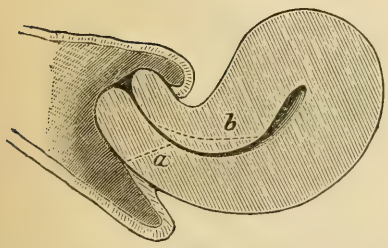


FIG. 142.—Lines of Incision in Anteflexion with Retroversion (Sims).

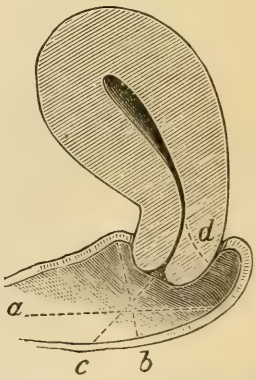


FIG. 143.—Uterus with Faulty Direction of External Os. *a*, axis of vagina: *b*, normal direction of external os; *c*, present direction of external os; *d*, line of incision (Sims).

in this section are taken. As Sims' operation and views in this matter had been misunderstood until the explanation contained in the above article, I have been careful to reproduce the operation precisely as he gives it there.

The manner of performing this operation is as follows: The direction, curve, and dimensions of the uterine canal having been thoroughly studied, the cervix is exposed through Sims' speculum, the anterior lip seized with a tenaculum, and the straight blade of Sims' metrotome "set in the handle

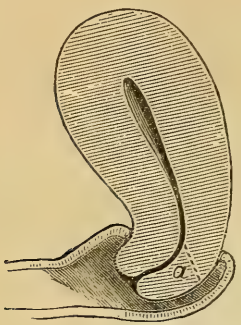


FIG. 144.—Division of Posterior Lip in Anteflexed Cervix (Sims).

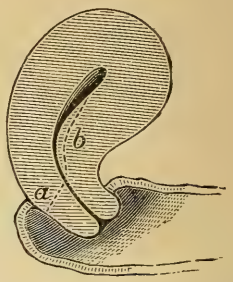


FIG. 145.—Lines of Incision in Acute Flexion at the Os Internum (Sims).

with blade backward, is passed into the cervical canal until the point passes through the internal os. If the flexion is marked, the knife will not pass easily; a fine grooved director, bent at the required curve, should then be introduced and the knife passed in along the groove. The director is then removed and the constriction divided; with gentle cutting motion the posterior portion of the cervix is split in a straight line back from the os tincæ nearly to the insertion of the vagina. The knife is then withdrawn, the blade is turned in the handle so as to cut anteriorly, and again passed into the canal of the cervix as before, and in withdrawing it the obstruc-

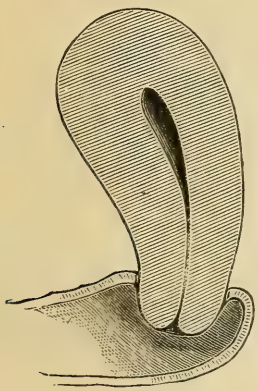


FIG. 146.—Uterus with Cervix Equally Developed, but with Constricted Canal, Suitable for Simpson's Operation (Sims).

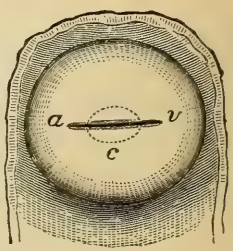


FIG. 147.—Bilateral Division of Os: *a*, *v*, Lines of Incision; *c*, Size of Os Twelve Months after Operation (Sims).

tion at the point of greatest flexure, at the os internum, is incised anteriorly. The blood is sponged away, and the trivalve dilator is used," and the plug introduced, and the wound dressed as already described. Sims formerly used the scissors for splitting the posterior lip, but now prefers

the knife for this also. The passage of the knife through the internal os of an acutely flexed canal is often very difficult.

The direction, length, and depth of the incisions are shown by the dotted lines in the cuts, and therefore need not be further described.

Accordingly as the operation of posterior section is done for anteflexion of the cervix, or anteflexion of the body, Emmet incises only the posterior lip and the posterior wall up to the internal os, or cuts through the anterior wall and through the internal os also. The lines of incision are shown in Figs. 148 and 149.

Emmet uses the scissors for the first incision, and completes the operation with the knife. The probe is carried into the canal as a guide to scissors and knife. Emmet tampons the cervix with glycerized cotton instead of the plug.

The after-treatment is precisely the same as after Simpson's operation.

The *dangers* of these two operations, Simpson's and Sims', are pretty nearly equal. After both we may have serious hemorrhage, peritonitis or cellulitis, septicemia, death. Sims admits two deaths, one after his, the other after the bilateral incision, among somewhat less than a thousand operations. He also speaks of two instances of hemorrhage from the circular artery, which was so severe as to require a suture-ligature to be passed through the cervix and tied over the anterior edge of the os. The artery was cut by the anterior incision. Dr. Emmet has also met with this accident. Of one hundred and five cases which the latter operated on in his private hospital and the New York Woman's Hospital, there were three deaths from peritonitis, in each of which imprudence on the part of the patient might fairly be considered the chief factor. A number of cases of cellulitis occurred, but the exact figure is not given.

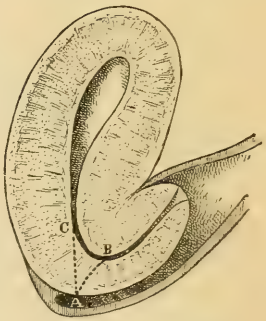


FIG. 148.—Lines of Incision in Flexure of the Cervix (Emmet).

Since he began the use of his hard plug, Sims was not troubled with hemorrhage after these operations; and Emmet states that the proper precautions adopted by him since the above-mentioned accidents (such as antiseptic treatment of instruments and wound, watchfulness, performance of operation only at a spot where a physician can be immediately procured in case of need) have prevented a recurrence of either hemorrhage, peritonitis, or severe cellulitis.

A compilation by Beigel of 900 cases by Tanner, Ballard, Sims, Emmet, and Greenhalgh, shows 5 cases of death from peritonitis, 3 severe hemorrhages, and 6 instances of cellulitis. Of German authors, Hegar and Kaltenbach had 2 deaths in nearly 300 cases, which occurred before they began to use antiseptic precautions; Martin, 1 death and several hemorrhages in 386 cases; Carl Braun, 291 cases with 1 hemorrhage and 1 cellulitis; Gustav Braun, 107 cases with 4 of peritonitis; Kehrer, 86 operations with 4 cases of cellulitis and peritonitis, and 1 death; Chrobak, 250

cases, with 2 hemorrhages and 2 attacks of cellulitis, up to 1876, since then, 50 operations without accident. Thus, among 2,425 collated cases, together with the unnumbered ones of Sims, certainly in all 3,500, we have 9 deaths. The cases of severe peritonitis, cellulitis, and hemorrhage are not recorded with sufficient accuracy to be of value, but were certainly as high as twenty per cent., all together. One great defect of these statistics is that it is not mentioned in many of the foreign cases whether only the external os, or the internal os also was incised. This may account for Carl Braun's want of accidents, for, of course, the mere division of the external os is but a trifling matter. The depth of the incision through the internal os depends, in Sims' method, greatly upon the dexterity and experience of the operator, since only a practised finger can tell how deep and where to cut. As a rule, it is better to err on the safe side and not cut too deep, and if the operator is not rashly bold, this is generally the case. Only a very practised operator, like Sims himself, will be able to gauge precisely how deep he may cut without wounding the circular artery or the peritoneum. If the mechanically working metrotomes are used, the cut may be too small if one does not allow for the elasticity of the tissues, and too large if the screw is set so as to expand the blades more widely in anticipation of this elasticity. The knife is therefore thought to be the safest instrument.

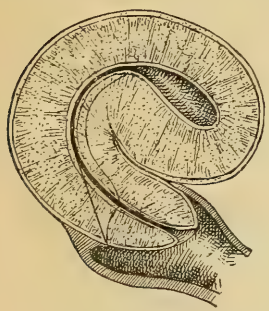


FIG. 149.—Lines of Incision in Flexion of the Body (Emmet).

With the proper precautions, and carefully omitting all cases to be mentioned under counter-indications, the operation of division of the cervical canal and internal os, according to Simpson or Sims, may be considered as not especially dangerous. Sims contends that it is no more dangerous than forcible, rapid, or gradual dilatation, while much more effectual. His wonderful dexterity no doubt accounts for his good results and his immunity from accidents since the adoption of his improved method, as above described. An inexperienced operator will probably do far less damage with dilatation by non-cutting instruments.

The *counter-indications* are again the same as repeatedly stated for all manipulations on the uterus: all acute, subacute, and chronic inflammatory conditions of the pelvic organs; purulent discharge from the uterus, which might infect the wound; the proximity of the menstrual period (one fatal case by Emmet, and two severe cases of cellulitis by Chrobak, were due to the performance of the operation a few days before menstruation).

The *curative value and permanent benefit* of these operations is by no means assured; for statistics of successes, as regards the relief of dysmenorrhea, and chiefly as regards conception, have not been furnished by the operators whose figures were quoted above. Frequent isolated cases of speedy conception, after the operation, have been reported by all of them, but an exact proportion of successes and failures has not been published.

Of the four hundred and eighty-three discissions (whether external os, or internal os also, is again not stated) performed by Haartmann, Braun, Martin, Kehrer, and Chrobak, one hundred and forty-eight, equal to 30.7 per cent., were successful. But whether the dysmenorrhea or sterility was cured is not stated in a sufficient number of cases to be of value. A large and careful statistical compilation of the indications, exact method of treatment, and results as regards cure of dysmenorrhea and sterility, by the various methods of bloodless dilatation, the Simpson, Sims, and Peaslee operations, and the simple division of the external os, respectively, would be exceedingly interesting and of immense practical value.

So much appears certain that, *ceteris paribus*, an open external os and straight and large cervical canal are more favorable to impregnation than a small external os and narrow and crooked canal. If, therefore, no other cause for the sterility can be ascertained but a narrow cervical canal, it is fair to assume that this is the cause of the sterility, and to give the patient the chance of cure by enlarging it.

The impossibility of recognizing the cause of sterility in those cases in which ovarian disease or encapsulation of the ovary in adhesions, or stricture of the Fallopian tubes, or imperfect maturation of the ova, are at fault, will, of course, render any efforts at cure, by discission or otherwise, futile. In estimating the value of statistics on this subject, this fact should be taken into consideration.

The great difficulty with all operations for dilatation of the cervical canal, bloodless or by cutting instruments, is the persistent tendency of the canal to contract again. Even the most widely opened canal will be found in a few months as small as before, and if cicatricial contraction has chanced to be exceptionally great, it may even be smaller than before the operation. Or, the divided lips may unite unequally, so as to form flaps which obstruct the entrance to the external os. Or, the edges of the enlarged os may become dense, gristly, and unyielding. Or, the incisions through the intravaginal portion may have been so deep, and the retraction of the flaps so great, that an eversion of the cervical mucous membrane, an ectropium, as after parturition, takes place, and the flaps require to be united by paring their edges and inserting silver sutures, as devised by Emmet for puerperal laceration. Careful attention to the after-treatment will hinder the contraction of the canal, and avoidance of too deep or unequal incisions will prevent subsequent malformation or ectropium.

Superficial Trachelotomy (Peaslee's Operation).

In the belief that the two operations just described, the deep bilateral, and the deep antero-posterior section, were unnecessarily severe, produced too large an injury, and left a mutilated cervix and gaping os, and were furthermore often followed by serious and fatal results, Dr. E. R. Peaslee devised and practised an operation, which consisted in merely cutting through the external or internal os, or both, if one or both were constricted, to a depth sufficient to make the canal of the average width of a

parous woman. According to Peaslee, if the external os does not easily admit a sound one-sixth of an inch in diameter, there is stenosis as to conception ; if no more than one-seventh of an inch, probably also dysmenorrhea.

If the internal os readily admits a sound one-sixth of an inch in diameter, there is no absolute but possibly relative stenosis ; *i.e.*, passage for the sound, but not for fluids. If a sound of one-seventh of an inch is easily passed, there is still no stenosis, unless the symptoms indicate obstruction. This is the normal size in the imparous woman, and the size of Simpson's sound.

If a sound but one-eighth of an inch in diameter cannot be passed through the internal os, there is stenosis, or flexion.

In an external os of one-seventh or one-sixth of an inch, and an internal os of one-eighth of an inch, absolutely, and one-seventh of an inch, relatively, the operation of superficial trachelotomy is indicated. If congestion of the uterus is superadded to the above diameters, the operation is still more called for, and even an internal os of one-seventh of an inch may require division.

The constricted canal is now to be enlarged to the average size in the healthy woman who has borne children, which Dr. Peaslee says is rather less than one-fourth at the external os, and slightly less than one-fifth of

Fig. 150.—Uterine Portion of Peaslee's Metrotome, with Blade Protruding.

an inch at the internal os. He therefore thinks that an enlargement to one-fourth of an inch at the external, and one-fifth of an inch at the internal os, is amply sufficient for all practical purposes for the relief of dysmenorrhea and sterility. If congestion is present, the limit may be extended to one-third of an inch, and to nearly one-fourth of an inch, respectively.

The incisions are not made to the same depth in every case, but very rarely extend deeper than through the mucous membrane at the internal os, perhaps barely nicking the submucous stratum.

The instrument with which this operation is performed is seen in Fig. 150. It consists of a flattened tube eight inches long and seven-sixteenths of an inch wide, except the terminal one and three-fourths inch, which has a width of but one-eighth of an inch. In this tube a blade slides easily, with a nut and screw at the proximal end to gauge the extent of its passage into the cervical canal. The blade has a blunt point, and lateral cutting edges for one and five-eighths of an inch at the distal end. There are two blades for each instrument, the cutting portion of one being one-fourth of an inch wide, of the other three-sixteenths of an inch. If the stenosis is confined to the internal os, the narrower blade only is used ; if both ora are contracted, the wider blade is passed through the external, and the narrower blade then through the internal os. In decided conges-

tion the wider blade may be passed through the internal os also, which will then easily admit a sound one-fifth of an inch in diameter.

The operation is performed through the Sims speculum, or the metrotome may be guided on the finger like the sound.

The tube is passed into the cervical canal up to the shoulder, and therefore one-fourth of an inch through the internal os. The blade is then passed in, having been previously gauged, and carried up as far as necessary to divide the stenosis. If the external os is too narrow to admit the instrument, it may be nicked with a bistoury.

The operation is not at all dangerous, and Dr. Peaslee reports having performed it many times in his office, sending the patient home to bed after a short time. Out of over three hundred operations he saw but one case of slight abdominal tenderness for several days, and twice slight cel-

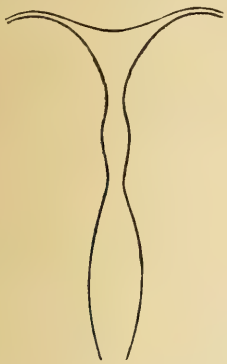


FIG. 151.—Normal Uterine Cavity (Peaslee).

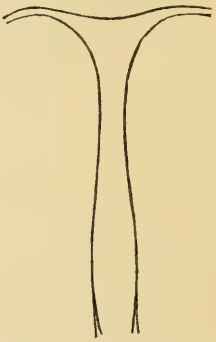


FIG. 152.—Uterine Cavity as Enlarged by Peaslee's Operation (Peaslee).

lulitis at the Woman's Hospital, in patients who had had cellulitis before. The patient is kept in bed for two or three days and not allowed to walk for a week. The conical dilator of the corresponding size is passed immediately after the removal of the metrotome, and every other day for a week, and once a week for two or three weeks longer.

Dr. Peaslee claimed to have obtained by this operation a uterine canal of the average normal width in the healthy parous woman, as shown in Figs. 151 and 152.

The results of this operation have not been stated, any further than that its author asserts that "it removes stenosis perfectly, and in most cases permanently, since there is very little tendency to closure of the slight incision made." If the cervical canal really retains the width given it by Peaslee's operation, it is evidently sufficiently large for all practical purposes, as regards the cure of dysmenorrhea and sterility, and Simpson's operation should be abandoned as unnecessarily severe and dangerous. Sims' operation, be it understood, does not come under this category, being designed for a different class of cases, namely, anteflexion and distortion of the cervix.[1]

[1] It may be well to avoid misunderstanding by saying here that Dr. Peaslee's idea of the operation which he called Sims' in his celebrated article on Incision and Discission

I am not aware whether subsequent observations have proved the permanency of these superficial incisions recommended by Dr. Peaslee. In view of the prevalent tendency to bold surgical measures, his advice should certainly be heeded and put to the test.

Wedge-shaped Excision of the Lips of the Cervix.—In some cases the only obstruction to the entrance of the seminal fluid into the uterus seems to be a peculiar formation of the lips of the external os, by which the anterior lip closes, as with a valve or apron, the entrance to the cervical cavity. Fig. 153 shows this formation. To remove this obstruction is obviously the indication.

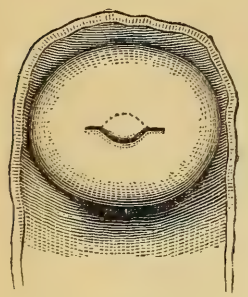


FIG. 153.—Projection of Anterior Lip of Cervix. Dotted line marks incision for removal of wedge (P. F. M.).

The nature of the operation is shown by the dotted lines in the figure. A straight sharp- or blunt-pointed bistoury is passed into the external os and the overlapping anterior lip (it is seldom the posterior) is cut out for about one-fourth of an inch, the piece removed having the shape of a short wedge. This little operation can be performed at the office, and is entirely devoid of danger. It leaves a transverse os (similar to that shown in Fig. 135), which should be kept open by first inserting a cotton plug for several days, and then occasionally separating the lips with a branched dilator, until permanent cicatrization has taken place.

A condition practically producing the same effect is not unfrequently observed in parous women, in whom the otherwise large, perhaps lacerated, external os is almost completely closed by a hyperplasia of the follicles of the lining membrane of the cervical canal on one lip or the other. A bright red, eroded, and easily bleeding mass, resembling a strawberry, is seen occluding the os, and is curable by performing the same wedge-shaped excision. This condition is represented in Fig. 239.

Other complicated excisions of the substance of the cervix for the purpose of maintaining a patulous external os, have been devised by Simon, Kehrer, and others. Their consideration involves so much description, and their adoption has not as yet been assured, so that I am compelled to omit them from this work.

VIII. CURETTING OF THE UTERINE CAVITY.

By curette, or scoop, we understand an instrument shaped like a spoon, which is designed for the removal, by a scraping, tearing, or cutting action, of certain pathological tissues. The curette was first introduced by

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of the Cervix Uteri, read before the New York Academy of Medicine, June 1, 1876, and published in the American Journal of Obstetrics for August, 1876, has been pronounced erroneous by Sims himself in the paper above referred to on Stenosis Uteri, published in the American Gynecological Transactions, Vol. III., 1878. Dr. Peaslee, it would seem, labored under a misapprehension, and mistook a modified Simpson operation for that which Sims wishes to be called by his name, the antero-posterior section.

Récamier in 1846, and has since become exceedingly popular, both in its original and various modified shapes. Many authorities pronounced the practice barbarous and unscientific (Chassaignac, Becquerel, Dubois, Scanzoni, Credé), but in vain : the curette maintained its fame and increased in popularity. And no wonder, for it enabled the surgeon to remove in a few moments with perfect certainty, safety, and almost without pain, pathological tissue which by caustics and acids could scarcely be removed in weeks. If it was " unscientific," it was effectual, and it certainly is no more barbarous to scrape out a cancerous cervix or a uterus for vegetations, than to cauterize the surface with fuming nitric or with chromic acid.

One or the other form of curette has therefore now become a necessary instrument to the gynecologist. There are four varieties of curettes in present use : the dull copper-wire loop, of Thomas ; the long subacute spoon, of Récamier ; the sharp cutting loop, with flexible shank, of Sims ; and the sharp cutting spoon, with stiff shank, of Simon. Of these, each has its special indications and dangers, and will, therefore, be described separately.

The Dull Curette of Thomas.

The copper-wire curette, without cutting edge, was devised by Dr. T. G. Thomas. It is an instrument nine inches long, three and one-half inches of which form the wooden handle, made of soft copper wire, one-sixth of an inch near the handle and tapering down to one-twelfth to one-sixteenth of an inch in thickness at one-half inch from the end, where it is bent into an elliptical loop one-fourth of an inch broad, the wire at the loop being flattened on the scraping surface. The wire at the inception of the loop is so soft and flexible that any greater than a superficial pressure will cause it to bend, whereby a deep injury to the uterine mucosa is absolutely avoided. Besides, at the junction of wire and handle, the former is grooved, so as to bend easily at that point, also with the object of preventing firm pressure. The breadth of the loop mentioned above, one-fourth of an inch, is the usual size ; but there are two other sizes made, one larger and one smaller, in proportion to the patency of the cervical canal. I have of late been using for mere diagnostic curetting a very fine, slender loop devised by Bangs for exploration of the male urethra.

It may seem that this flexible blunt loop of wire is too frail to be of real service, but experience has amply shown that it fully answers the purpose for which it was intended, and that gently drawing it over the uterine mucous membrane suffices to detach the projecting vegetations or granulations and to cure the case, without requiring or subjecting the patient to the danger accompanying the use of a stiff, sharp steel scoop.

Indications.—There is really only one indication for the use of the curette, and that is pathological uterine hemorrhage, menorrhagia, or metrorrhagia, which has resisted all other remedies, and for which no physical cause, constitutional or local, can be detected by the usual means

of exploration. In such a case we are compelled to look for the cause of the hemorrhage in some intra-uterine disease, not distinguishable by the ordinary digital and specular examination. The curette will then give us the required information, for by it we shall either remove a portion of the growths causing the hemorrhage, or receive a negative result at least, in the assurance that the uterine cavity is empty and healthy. The first and chief use of the curette, therefore, is as a *means of diagnosis*, and as such it must be employed in almost every case until its withdrawal shows the presence or absence of an exciting cause. The unirritating nature of the operation with the wire curette renders this procedure entirely justifiable

FIG. 154.—Thomas' Dull Copper-wire Curette.

and harmless, while sufficiently effective. Having thus ascertained, by means of the curette, what the cause of the hemorrhage is, if located in the uterus, we find that it is one of three *conditions requiring the therapeutic employment of the curette*. These are, taking them in the order in which they are commonly met with: 1. Chronic hyperplastic endometritis, or fungous degeneration of the uterine mucous membrane. 2. Retention of adherent placental villi after miscarriage. 3. Diffuse sarcoma of the mucosa of the body of the uterus.

1. Endometritis hyperplastica chronica or polyposa (Olshausen), fungous degeneration of the uterine mucous membrane (Thomas), fongosités utérines (Récamier), endometritis chronica (Hegar and Kaltenbach), metritis hemorrhagica (Weber, St. Petersburg), metritis villosa (Slavjansky), manifests itself by three separate anatomical conditions: (*a*) diffuse, low granulations, developed in patches, eroded and ulcerated by chronic catarrh, or spread over the whole mucosa, similar to granular conjunctivitis (Atthill); (*b*) a uniform general hyperplasia of the whole mucosa of the uterine body without polypoid formations, "an unhealthy pulpy condition of the

FIG. 155.—Thomas' Curette, Medium Size.

mucous coat" (Tanner); and (*c*) numerous polypoid fungous vegetations scattered over the hyperplastic mucosa, the endometritis polyposa of Olshausen. In this last category might be included mucous polypi, which, however, are rare in the cavity of the uterus proper, and are generally confined to a limited portion of the endometrium.

All these pathological conditions are well known to produce hemorrhage, which is arrested only by the removal of the exciting cause. The masses removed by the wire curette in class *a* will generally possess more the character of fine shreds and turbid bloody mucus without actual distinct pieces of tissue, the curette merely crushing and obliterating the

flabby granulations; in class *b*, soft pale slices and irregular patches will come away; and in class *c*, distinct, flattened, polypoid vegetations, varying in size from a millet-seed (the usual size) to a pea or bean, and soft and pulpy in consistence.

Occasionally all these neoplasms are combined, and removed in the same case.

The vegetations, or fungosities consist histologically of structureless basement substance, containing great quantities of small round-cells and nuclei, and portions of uterine follicles and vessels. Granulations have no follicles.

Olshausen states that endometritis polyposa strongly resembles the broad based molluscum of the corpus uteri described by Virchow, the great difference being, however, that in the latter affection large masses of dilated glands are found, which are absent in the former. A microscopical examination will usually be required to determine the exact nature of the masses removed, should there be any doubt on the matter. It should further be stated, that endometritis polyposa is limited strictly to the cavity of the uterus proper, stopping at the os internum, below which commences the region of enlarged Nabothian follicles and mucous polypi, for the removal of which Thomas himself recommends Sims' sharp curette.

Endometritis polyposa is not confined to the married or parous woman, but occurs also not unfrequently in the single female, even after the menopause. It generally owes its origin to a chronic catarrh of the endometrium, the ordinary muco-purulent discharge of which has gradually become more sanious or pure bloody, accompanied by profuse menstrual flow, and gradually increasing anemia, and general debility. The previous existence of a profuse chronic leucorrhea will, therefore, convey a suspicion of the presence of this affection. The local symptoms are often slight, generally merely the ordinary pelvic weight and dragging met with so commonly in uterine disease. The cervix is usually soft, the external os often more or less gaping, and the cervical canal and internal os patulous. The finger passed into the uterine cavity will feel the mucous membrane swollen and spongy. To detect the vegetations themselves by the touch would scarcely be possible, owing to their scattered site, small size, and pulpy consistency. No one portion of the endometrium seems particularly favored by these growths, for I have removed them with the curette from either surface. The number of vegetations may vary from two or three to a dozen, or a whole teaspoonful or more, their size from a millet-seed to a bean, the latter being rarely met with.

I have, in a certain number of cases, found the presence of metrorrhagia due to vegetations accompanied by a marked laceration of the cervix. Unquestionably, this laceration was the first factor in the chain of pathological changes, viz., laceration, subinvolution, hyperplasia of stroma and mucous membrane of uterus, proliferation of glandular elements, vegetations, hemorrhage. The treatment must, therefore, proceed in the inverse ratio: removal of vegetations, reduction of enlargement of mucosa and stroma of uterus; finally, for permanent cure, union of laceration.

When we consider how easily the diagnosis of this affection is now made by the curette, we must wonder at its having been so rarely recognized, and so little appreciated, as it undoubtedly has been since its discovery some thirty years ago. The explanation given by Olshausen for this neglect is probably the correct one, namely, that the sharp curette having been proscribed, the only means of diagnosis of the affection was by the finger, after opening the canal by laminaria or sponge-tent (still the only method advised by Atthill, in 1873), the former of which flattened out the growths and rendered them impalpable, and the removal of the latter destroyed them.

After what has been already said, it seems scarcely necessary to remark that constitutional treatment is of no avail whatever for the cure of this affection, and consists only in remedies designed to support and restore strength. Topical applications of caustics (argenti nitras, tincture of iodine, liq. ferri persulph.,) have by long experience been found but temporarily beneficial in arresting the hemorrhage ; stronger caustics, such as nitric and chromic acid, will, it is true, convert the whole surface of the uterine mucosa into an eschar, and thus probably cure the disease. But as, in any case, the disease, with its exciting cause, is liable to recur, and as the use of these strong caustics is always attended with more inconvenience, pain, and danger than are ever found to result from the simple operation with the wire curette, the latter instrument should invariably be preferred to caustics in these cases.

2. Placental villosities are very frequently detected in utero after a miscarriage, particularly when the placenta was expelled alone, after the birth of the embryo, or was manually removed. These patients generally continue flowing after the miscarriage for a longer or shorter time (often profusely), until their weakened state finally obliges them to seek medical advice, usually after the fruitless employment of a variety of constitutional hemostatics. Should the cervical canal still be sufficiently patent, the finger will readily detect an irregular, rough, circumscribed spot on the endometrium. Or what is equally positive and more applicable through the generally contracted os, the curette makes that discovery, and at once removes a fragment, the macro- and microscopical appearance of which readily assures the diagnosis, and points out the immediate cure of the hemorrhage, by the removal of its exciting cause.

3. Diffuse sarcoma of the uterine corporeal mucosa is a very rare disease, only sixteen instances of which have, according to Schroeder, been recorded in literature. It should not be confounded with sarcoma of the parenchyma of the uterus, which is decidedly more frequent, and resembles, in its macroscopical characteristics, the ordinary fibroid tumor of the uterus. Diffuse sarcoma of the mucous membrane is confined almost exclusively to the body of the uterus, only two cases of its occurrence in the cervix being recorded (both by Spiegelberg), and appears as a soft, flabby, villous growth, spreading over a greater or lesser surface, and rapidly assuming an irregular polypoid shape. It is in its early stages only, that it is amenable to treatment by so simple an instrument as the wire curette ;

later on the sharp scoop or the galvano-cautery are required. The differential diagnosis between diffuse sarcoma, unusually prolific vegetations, and retained placental fragments, can, as a rule, be made with certainty only by the microscope, and is then easy enough, the distinctive histological features of each of these masses being sufficiently characteristic. The symptoms of diffuse sarcoma in the early stages resemble those of endometritis polyposa, but the hemorrhage is generally more profuse, and alternates with watery discharges frequently mixed with shreds, and there is often more or less pelvic pain.

Another class of cases in which the wire curette can be advantageously and safely used, are those of carcinoma of the cervix, in which, after amputation, the sharp scoop or cauterization, fresh, readily-bleeding granulations spring up. These I have repeatedly removed off-hand with Thomas' curette, applied nitric or chromic acid, or bromine, or solution of the persulphate of iron, and sent the patient home. Large masses of cancerous tissue would, however, require a more powerful instrument, like Simon's sharp scoop, the use of which should be attended by all the precautions employed during and after a serious operation.

While for mere diagnostic curetting it is not, as a rule, necessary to anesthetize the patient, the thorough scraping of the uterine cavity is decidedly facilitated by rendering the patient insensible to pain. Formerly, I did not think this necessary, and have curetted many a uterus at my office and the dispensary, allowing the woman to return home immediately afterward, with directions to keep quiet for a day or two, and no bad results followed this, which, in later years, I have recognized to be a hazardous practice. One or two experiences of quite profuse hemorrhage during the curetting, and three cases of cellulitis following curetting and cauterization with nitric acid of the cervical cavity only, have rendered me more cautious in these apparently trifling operations; and I now *never* do thorough therapeutic curetting elsewhere than at the residence of the patient, keeping her in bed for three or four days afterward, and, unless the patient objects or a counter-indication exists, I prefer to use an anesthetic.

It is doubtless possible to introduce the curette into the uterus, and scrape over more or less of its cavity through a bivalve or cylindrical speculum, or without a speculum, on the finger only; but such a procedure can be at best incomplete (then truly performed "almost at random," as Atthill says), because the narrow field afforded by the specula named prevents free movement of the instrument. An inflexible steel curette can doubtless accomplish its purpose when simply introduced on the finger, and I have repeatedly removed both carcinomatous masses and large masses of placenta in this manner with Simon's scoop, guarding uterus and instrument with the other hand on the abdomen. But the only true way of operating with Thomas' curette, is through Sims' speculum in the left semiprone position.

The patient having been placed in Sims' position, and the cervix being exposed with Sims' speculum, the operator seizes the anterior lip of the cervix with a tenaculum, draws the uterus gently down, thereby straight-

ening its canal and holding it steady, introduces the sound or probe to ascertain the direction and length of the uterine canal. Bending the shank of the curette, in accordance with the information thus obtained, he passes it into the cavity of the uterus, which he carefully explores by drawing the curette gently over the whole mucous membrane, always in the direction from the fundus to the internal os. Should the vegetations be large or very numerous, or the mucosa much hypertrophied, a certain feeling of resistance or a rough grating sensation will be imparted to the finger of the operator, revealing to him the presence of the neoplasms. In case of adherent placental remnants, this grating sensation is particularly distinct, and can even be faintly audible to the bystander. A very slight flow of blood accompanies this operation, never more than a tablespoonful or two. Having completed the tour of the uterine cavity the curette is withdrawn, bringing with it blood, and, if present, vegetations, placental fragments, or carcinomatous masses. These are easily secured and detected by wiping out the vagina with dry cotton, on which the small, pale, flat, elongated, homogeneous-looking vegetations, or the firmer particolored placental fragments, are readily discernible amid the coagula. The detection of sarcoma will devolve on the microscope. If the operator wishes to make sure that all neoplastic formations have been removed, the curette may again be introduced, and the vagina then tamponed with cotton soaked in glycerine. In severe cases a dose of morphine may be ordered after the operation, and I generally leave a prescription for morphine suppositories to be used if required; but often no other immediate after-treatment than rest is required. I have been in the habit of painting the whole of the uterine cavity, immediately after cleansing it with cotton, with Churchill's tincture of iodine, as a styptic and caustic (although really not needed as such), and chiefly as a disinfectant and alterative, to insure the thorough destruction of the neoplasms and the absorption of the hyperplastic tissue; in protracted cases, where the number of vegetations was great or the hemorrhage profuse, I have left a tent of cotton soaked in iodine in the uterine cavity, directing the patient to withdraw it by the attached string in forty-eight hours, when she removes the vaginal tampons. If the uterine plug should resist traction, it may be left in another twenty-four hours. In order to enable the patient to distinguish the string of the uterine plug from those of the vaginal tampons, it is well to make a knot in it. I have never seen the least ill-effects from this treatment, but do not deny that I may be mistaken in considering it more efficacious than the simple painting of the cavity.

Should the neoplasm be discovered to be sarcoma, the cavity of the uterus must be thoroughly opened by laminaria or tupelo, and nitric acid or the galvano-cautery applied.

As a rule the external os is, even in nulliparæ, sufficiently patent to admit the curette, and the same may be said of the internal os, which the profuse hemorrhage has tended to dilate. Occasionally, when even the smaller-sized curette will not pass, I dilate the internal os with Ellinger's steel two-branched dilator, and then experience no further difficulty. Di-

latation with tents is rarely required. The pain attending the operation of curetting, as above described, is usually but slight; it occupies barely five minutes, and the reaction is *nil*. As I have already stated, it is advisable to avoid all risks by performing the operation at the house of the patient or in a hospital, and keeping her in bed for twenty-four hours afterward. The simple introduction of the sound has produced cellulitis and metroperitonitis; it cannot be denied, therefore, that the wire curette *may* at any time, in a peculiarly susceptible patient, light up a similar trouble.

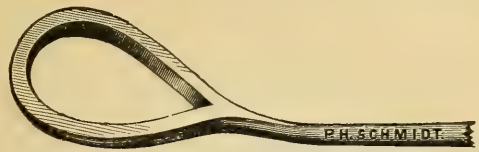


FIG. 156.—Mundé's Large Dull Curette for Removal of Placenta after Abortion, Natural Size.—Length of whole instrument, with handle, sixteen inches. Used chiefly to pry and scrape away the placenta, in a longitudinal direction (P. F. M.).

But an ordinary diagnostic exploration of the uterus with the curette, and the gentle removal of a few vegetations, is really an almost innocuous procedure, and not likely to be followed by evil consequences, even if performed in the physician's office.

It must be borne in mind that, if the diagnostic curetting does not detect any cause of the hemorrhage, at all events no harm has been done, and the negative answer is in itself valuable information. Cases are even met with in which the curetting, while not detecting any neoplasm, still cures the metrorrhagia apparently by its alterative stimulant action on the relaxed uterine mucous membrane. And this is doubtless the manner in which it benefits cases of granulation and diffused tumefaction of the endometrium without vegetations.

If the uterine mucous membrane is healthy the wire curette will not injure it, and no shreds will therefore be removed; with the sharp curette, however, even the most delicate and practised hand can scarcely avoid

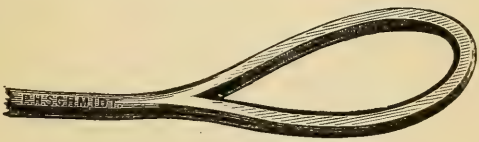


FIG. 157.—Elliptical Loop to be Screwed on Handle of Mundé's Placental Curette.—Chiefly used for smaller os, and lateral motion in scraping (P. F. M.).

shaving off slices here and there, the depth of which lesions cannot always be foreseen. It is this latter diagnostic curetting which must be termed harsh and "unscientific."

Counter-indications do not really exist, except such as would equally prohibit the introduction of the sound, viz.: acute or moderately recent pelvic or uterine inflammation, which should first be allayed by appropriate means before hazarding the curette.

I have employed the dull curette many times, and have never failed to

cure the case when the diagnostic curetting showed the presence of any of the benign neoplasms described above. In certain cases of hyperplastic or subinvoluted uterus, with large cavity and gaping orifice, a larger sized curette (Fig. 155), which occupies about the middle place between the small scoop shown in Fig. 154 and the largest size seen in Fig. 156, will enable us to remove, with far more certainty, every vestige of pathological tissue, which might here and there escape the smaller instrument. The large curette seen in Fig. 156 is used solely to remove the whole placenta or portions of it immediately or within several days after abortion, so long as the cervical canal is still sufficiently open to admit it. It is not used with a scraping motion when the whole placenta is to be removed, but pries the organ off from the uterine wall by gentle oscillatory movements, until the whole is detached, when it is removed by long broad-bladed forceps. If only small lobes of placenta or diffuse villosities are to be removed, the usual scraping action is employed.

Récamier's Curette.

The subacute curette (*Récamier's*) is represented in the cut. It is used very much in the same manner as the dull scoop, except that the scraping action is exercised from side to side, and not from above downward. The peculiar shape of the instrument and lateral situation of its subacute edge accounts for this.

Fig. 158.—Récamier's Subacute Curette.

The indications are precisely the same as those for the dull curette, and need not therefore be repeated. I decidedly prefer the former instrument, as more safe while quite as efficient. Récamier himself met with three cases of death from perforation of the uterus by his curette ; Demarquay with two ; Chamberlain, of New York, saw a case of hysterical tetanus therefrom ; Peaslee a death from collapse ; Thomas a narrow escape from the same cause, and Barker a case of peritonitis.

Nevertheless, it is still kept in the shops and used by many operators.

Emmet has devised a curette-forceps, which resembles a double Récamier's curette. With it he crushes and removes the uterine vegetations, as he claims, quite as effectually as can be done by the ordinary curette.

Sims' Sharp Curette.

The *sharp curette with flexible shank* (Sims') consists of a steel loop with sharp, cutting edge, and with a steel shank sufficiently flexible to permit its being bent in any case to suit the uterine canal, and to prevent too much force being exerted during the operation. It may be made of several sizes, the one usually employed being the smaller instrument in the cut.

Indications.—Whenever a dull curette can be employed, there also may a sharp scoop be used, if the operator feels sufficiently skilful to avoid doing injury. But, as already stated, what can be done by a safe, and withal efficient instrument, should not be performed by another possessed of more dangerous qualities. Therefore, all ordinary benign vegetations and hyperplastic conditions of the endometrium should be treated by the dull curette ; and only when these vegetations acquire the suspicion of malignancy by their repeated return, or their microscopic appearance reveals the presence of heterogeneous tissue, or the scrapings are of undoubted malignant character, is it indicated to remove them and their substratum by a more powerful instrument. The sharp curette then comes into play within the uterine cavity. It should, of course, be handled carefully, in order not to cut too deeply and perhaps perforate the uterine wall, as happened to Spiegelberg and to Chrobak while curetting a sarcoma of the uterine cavity. Only unjustifiable brutal force could possibly perforate a normal uterine wall with Sims' curette.

Fig. 159.—Sims' Sharp Curette, with Flexible Shank.

Where it is desired, therefore, to remove all pathological tissue *thoroughly*, even down to the muscular coat, the sharp curette should be employed.

Another special indication for Sims' curette is a chronic, intractable endotrachelitis depending on hyperplasia of the cervical glands and associated with redundancy of the interglandular structure of the cervical mucous membrane. Mild applications, even strong acids, fail to destroy the redundant tissue, and only its complete removal will cure the case. This is easily, safely, and almost painlessly done by the sharp curette. The dull curette is not sharp enough and too flexible to scrape away the dense tissue, which may even need the inflexible scoop of Simon.

The sharp curette is used through the Sims speculum precisely like the wire loop. Of course the cervix must be sufficiently dilated to permit its easy passage and handling. The swabbing of the uterine cavity with tincture of iodine, iodized phenol, even nitric acid is indicated more after the sharp than the dull curette, in accordance with the gravity of the disease calling for the operation. In the cervical cavity the above caustics are usually applied after the curetting. If the external os is too small to admit the curette, it must be dilated or incised, as already described.

I have had made a sharp steel curette, with slightly flexible shank, which in shape and size closely resembles the dull wire loop of Thomas.

Its flat surface, while rendering it thoroughly efficient on a level plane, prevents the possibility of removing (gouging out) deeper tissues, as may so readily occur with the more curved instrument of Sims.

Simon's Sharp Curette.

The sharp curette with inflexible shank (Simon's) was devised by the late Prof. Simon in 1872, for the removal of cancerous tissue from the cervix uteri, in incurable cases, and for scraping out old lymphatic-gland abscesses and carious bones.

The instrument is composed of stiff, inflexible steel, the edge of the scoop being decidedly sharp, and the spoon itself quite deep and not perforated. There are five sizes, varying from that of a lentil to a small almond, with different curves of the stems to correspond to the various parts of the uterine cavity. The steel stems are fixed in stout wooden handles, the whole being of sufficient length (ten inches) to permit of their being passed into the uterine cavity without the aid of the speculum.

FIG. 160.—Simon's Sharp Curette, with Stiff Shank.

The *indication* for these stiff scoops is the removal of soft, fungous, bleeding granulations in cancer of the cervix, which has spread so far into the parametrium as to render the complete removal of the diseased tissue impossible. These granulations bleed and discharge freely, and thereby greatly debilitate the patient. Active caustics do not destroy the bleeding masses thoroughly, and besides are not quite safe owing to the proximity of the bladder, rectum, and peritoneum. In the curette we possess an instrument which enables us to remove these bleeding, cancerous masses rapidly, safely, and effectually. With the larger sizes the whole surface is quickly scraped clean, and with the smaller scoops the crevices and cavities in the cervix are gouged out and all cancerous tissue removed from them. In this manner the hemorrhage and discharge is at once checked, and the patient allowed to recuperate and regain comparative health, until after a few weeks or months the granulations sprout out again, and the operation has to be repeated again and again, until finally the patient succumbs to the constitutional effects of the disease. But her life has been prolonged by the curettings, and this is all that could be expected. I have repeatedly seen the raw, scraped surface cicatrize over and the hemorrhage cease entirely, the neoplasm continuing to grow into the parametrium and finally killing by cachexia.

It is, however, not advisable to curette every case of cancer of the cervix in which there may be malignant granulations at the external os. *If they do not bleed, let them alone*, for in such cases I believe that too early interference seems to stimulate the neoplasm to more rapid growth. You

cannot cure the patient in any case ; therefore do not operate on her unless there is a decided indication and a reason for haste.

Occasionally, it may be necessary to remove more than the superficial cancerous granulations from a funnel-shaped cervix with the curette. A whole enlarged epitheliomatous cervix, a cauliflower growth, may need to be rapidly removed, and no other instrument is at hand, or the galvanic cautery battery does not work (each of which occurrences happened to me once) ; in the largest sharp curette we then have a very efficient instrument for the removal of even so large a cervix. The epitheliomatous proliferations are soft and spongy, and readily yield to determined and vigorous strokes with the instrument.

The sharp curette has also been used to remove the whole or remnants of placenta from the uterine cavity after abortion. Boeters, of Berlin, has thus recommended and employed it, and I myself did so in two cases before Boeters. But this was before I had the large dull curette, which I should unhesitatingly prefer.

Method of using Simon's Curette.—The curette may be used under guidance of the finger only, or what is better, through a Sims or Simon speculum, which enables us to apply a caustic or tampon after the operation is completed. The larger spoons are first used to remove all loose superficial tissue, and when the surface is smooth the smaller sizes are employed to scrape out the various crevices in the growth, and to clear the cervical canal as high as the internal os, or higher if the disease has spread so far. The scraping is done with some force, and we can tell when the fibrous substratum has been reached by the hard, grating feel conveyed through the instrument. The soft, cellular, cancer masses are easily removed and gouged out, sometimes leaving quite a socket behind them.

The hemorrhage during the operation is ordinarily slight, although for the moment it may appear profuse, and ceases as soon as the vagina is mopped out. The curette, in fact, arrests the hemorrhage by removing its source, the vascular granulations. The point is to operate rapidly, vigorously, and thoroughly, and but little blood will be lost. Simon used only cold-water injections after the operation, but I have been in the habit of applying either an astringent, like saturated solution of alum or resin in alcohol, or more generally a caustic to the raw surface. I prefer the chloride of zinc, one to five, or stronger if a more decided slough is desired, cotton pledgets being soaked in the solution, squeezed dry, and placed in the excavated cavity, to be left there for three or four days until they come away voluntarily. The saturated solution of chromic acid, or persulphate of iron and glycerine, may also be used. The details of these applications have already been described in the chapter on Applications to the Cervix. It is obvious that the escharotic effect of these agents will be more thorough now than before the curetting.

The pain attending this operation is generally not very great, but it is better to give an anesthetic, since a sensitive patient might induce the operator to be less thorough, and hurry through the operation. In using the sharp curette in the uterine cavity, anesthesia is always advisable. The

mere act of curetting should not occupy longer than five minutes, the checking of the bleeding and the careful tamponade of the cervix with zinc-cotton and of the vagina with soda-disks occupying fully as much more time.

Dangers.—I have done this operation many times, and have seen no unpleasant reaction follow it, except in one instance. This occurred in London, where I was visiting the hospitals at the time. Dr. Alfred Wiltshire requested me to operate on a patient of his in the West London Hospital; I removed a large quantity of soft medullary tissue as far up as the internal os, and applied a tampon saturated in a weak solution of perchloride of iron. A violent peritonitis came on two days later, and on the tenth day, amid severe expulsive pains, a copious discharge of fetid fluid took place, and with it was discharged a solid, pear-shaped body, which proved to be all that was left of the uterus after the removal of the cancerous cervix. The patient recovered from the peritonitis, and a subsequent digital examination revealed entire absence of the uterus, and the vaginal roof closed by cicatricial tissue. The cancer returned in the cicatrix after a few months, and the patient died. This sloughing out of the *whole* uterus is very rare, only four other cases having been reported, so far as I know (Barker's, Mettauer's, Habit's, and Martin's).

The danger of wounding the peritoneum need not be dreaded, unless the tissue separating it from the seat of disease has become extraordinarily thin. This may be the case both in the cervix, when the disease has invaded the whole organ and the scoop removes almost the entire cervix, or in the uterine cavity, where the sharp scoop should always be used with great caution.

The removal of healthy uterine tissue even with the sharp scoop is scarcely to be feared, its density being ordinarily a sufficient protection against such an accident. When the tissue begins to creak under the strokes of the curette we may feel sure that sound substance has been reached, and our object should be to obtain this creaking sound all over the diseased surface, before all the cancerous tissue removable by the curette can be considered destroyed. To follow up the ramifications of the malignant cells along the lymphatics and among the stroma of the uterus by the curette (or any other means) is beyond our power, and we can, therefore, hope for none but temporary, palliative results after curetting and cauterization of the womb.

During the winter of 1881–82 a fatal case of secondary hemorrhage after amputation of an epitheliomatous cervix with the galvanic wire, and subsequent sharp curetting and searing with Paquelin, took place in my clinic at the College of Physicians and Surgeons. No blood whatever escaped after the amputation, but the curetting opened a small artery at the left of the cervix, all hemorrhage from which was thoroughly arrested by Paquelin before the patient was securely tamponed with alum cotton. She did perfectly well for forty-four hours, when, after the removal of the tampons, which were perfectly dry, and introduction of fresh tampons, a violent hemorrhage set in which, although arrested for twenty-four hours, then

again began, was found to be uncontrollable, and proved fatal seventy-six hours after the operation. Here obviously not the cautery wire, but the sharp curette and the deep slough caused by the Paquelin, which opened a branch of the uterine artery and a plexus of veins, were to blame for the hemorrhage. I have since performed precisely the same operation some twenty times, twice also opening a small arterial branch with the curette, but in no case did a secondary hemorrhage ensue. The possibility of cutting an artery with the sharp curette should be borne in mind, especially in these cases of cancerous softening of vessels and stroma.

IX. LOCAL DEPLETION OF THE UTERUS.

Blood may be drawn from the uterus in two ways, either by leeches applied to the cervix, or by punctures of the cervix and endometrium—scarification.

The indications for local depletion are twofold: 1, to disgorge the loaded uterine or pelvic vessels, in acute inflammation, or chronic hyperemia; and 2, to stimulate the sluggish circulation, either by unloading ectatic veins and the resultant immediate influx of a fresh stream, or by the nervous shock of the depletion.

Conditions of the first variety are: acute metritis, endometritis, and endotrachelitis. Acute ovaritis, pelvic cellulitis, and peritonitis might well indicate the local abstraction of blood; but the application of the leeches, or the performance of scarification, both being done through a speculum, entail so much disturbance to the patient that depletion by leeches and blisters to the skin of the abdomen are to be preferred.

A more common indication for local depletion is, however, the passive hyperemia of all the pelvic veins, which is almost inseparable from subinvolution and areolar hyperplasia of the uterus. The puffy, swollen appearance, and purple color of the cervix, the succulent, spheroid feel of the body of the uterus, and the sensation of weight, bearing-down, and fulness in the pelvis, are symptoms calling for an unloading of the utero-pelvic vessels. When and how often to perform this maneuvre is the question to be decided in each individual case. While in acute conditions one or two depletions (and it may be as well to say here that leeches are preferable under such circumstances) will generally suffice, in chronic, passive hyperemia—subinvolution, areolar hyperplasia, chronic endometritis, and endotrachelitis—the abstraction of blood should be repeated at intervals of once a week, more or less; in these latter conditions, scarification, while, perhaps, not quite as effectual, is greatly more convenient and, for various reasons, to be preferred.

Of the value of local depletion in acute affections of the uterus there can be no doubt; whether the object—the unloading of the blood-vessels and reduction of inflammation—cannot be as well accomplished by contracting the vessels by hot injections and abdominal applications, must be decided by the physician. If there is no counter-indication, the most rapid

effect will doubtless be produced by the leeches, which may and probably should be followed by the hot remedies.

Whether local depletion, however, is so positively beneficial—permanently beneficial, at least, in the chronic conditions afore-mentioned—is by no means so certain. The opinions are still divided as to whether it does any permanent good to abstract an ounce or two of blood every week or two from a hyperplastic uterus, whether the enlargement is in any manner reduced thereby, and the patient gradually restored. The disbelievers in the practice assert that the unloading of the blood-vessels is but momentary, and that the uterus immediately regains its former blood quantity; that absorption of the hyperplastic tissue is not shown, by experience, to be hastened by the abstraction of blood. It must be admitted that a cure will probably not be obtained in old inveterate cases of hyperplasia by this or any other means. But experience has proved to me, as to many others who favor local bloodletting, that the unquestionable temporary relief given by the abstraction of at least two ounces of blood from the cervix continues for some days or weeks, and that this practice, frequently repeated, will not only allay many of the local and constitutional symptoms (fulness, weight, nervousness, neuralgiæ), but will assist the hot injections, iodine applications, and glycerine tampons in accomplishing, after a time, what reduction in size and resolution of adventitious tissue may be expected in this obstinate affection. In the absence of other more positive remedies, it is certainly proper to employ any safe measure which may possibly be beneficial.

2. The second indication, that of stimulating the pelvic circulation, obtains in amenorrhea from chronic pelvic hyperemia (also found in subinvolution and hyperplasia), and from deficient development of the uterus. In the former cases the unloading of the enlarged veins and capillaries of their sluggish contents, in the latter the shock to the pelvic vaso-motor nerves, appears to be the manner in which the depletion acts. In both classes leeches are the preferable means, but scarification will often be successful. The result of such applications, made shortly before the expected menstrual period, which may or may not appear, and is usually scanty, will in the first variety very commonly be followed by a normal flow two or three days later. In deficient development the treatment will need to be more prolonged and more frequently repeated to do good.

The peculiar circumstance, that the flow of blood from the punctures will usually cease as soon as the patient leaves the table, and that the normal menstrual discharge will come on several days later, if the operation was done at the proper time, should be remembered, and the patient cautioned not to be discouraged if she finds the flow arrested when she reaches home.

The amount of blood to be taken at each sitting will vary from one to two ounces. This is quite sufficient to produce the desired local effect, and even if repeated as often as twice a week cannot weaken the patient. To be of service in chronic cases the depletion should be practised at least once a week for several months.

Counter-indications and Dangers.—If the rules given under indications be carefully observed, there are but few circumstances which would prevent local depletion. One of these is the presence of a hemophilic tendency in the patient. A woman who bleeds profusely from every needle-puncture or abrasion, should of course not be subjected to the risk of a possibly serious hemorrhage from a puncture of her uterus. The inadvisability of producing an influx of fresh blood in extensive chronic or subacute pelvic inflammation has been spoken of; we can never tell whether that influx may not rekindle the inflammation as well as refill the uterus.

A varicose vein on the cervix may be bitten by a leech or punctured, and quite profuse hemorrhage ensue. Or, the nerve-shock from the leech-bites may show itself in general erythema or urticaria, as was observed by Scanzoni, Veit, Leopold, and others; and hysterical symptoms of various kinds may also arise. Such accidents usually occur after leeching, rarely after scarification. Pregnancy must certainly be looked upon as a counter-indication; indeed, what could be the use of reducing physiological hyperemia of the uterus peculiar to that state?

When a counter-indication exists to the abstraction of blood from the cervix, or leeches seem necessary, and cannot be applied to the uterus (as in a narrow, constricted vagina in virgins, where a speculum cannot be introduced), the leeches may be placed on the labia majora, perineum, thighs, or about the anus. But it should be remembered that an opening of one of the large veins found at any of these regions may result in very severe hemorrhage.

Application of Leeches.—The only manner of applying leeches to the cervix is through a cylindrical speculum. A tube of sufficient size to closely fit around the cervix should be chosen, and care taken that no fold of the vagina to which a leech might attach itself protrudes into the lumen. (The large veins in the vaginal walls render the application of leeches to them unadvisable.) When the cervix has been well fitted into the speculum, it is wiped clean and dry, and the external os plugged with a small tent of cotton inserted on a slide-applicator and cut off smoothly with scissors at the level of the surface, or by the end of a sponge-tent. This is done to prevent a leech from crawling into the uterine cavity, an accident which may produce severe uterine colic, hemorrhage, and shock. If this should occur, the leech may be stupefied, by gently injecting a few drops of salt-water into the uterine cavity, and then seized with long, thin dressing-forceps and withdrawn, or be left to the expulsive efforts of the uterus. While not a dangerous accident, its occurrence is unpleasant, because it delays the operation, causes annoyance to physician and patient, and may give rise to considerable pain. Obviously, the leech, living or dead, cannot be left in utero for an indefinite period. It must be removed before the physician takes his leave. Weber recommends passing a threaded needle through the tail of each leech before putting it into the speculum, and to guard against its escape by holding the string in the hand. The efficiency of the leeches is said not to be diminished by this

practice. It certainly would be effectual in preventing their escape. The number of leeches should be counted, as they are introduced, in order that the physician may be sure of having removed all when the operation is completed. These preliminaries arranged, the leeches are put into the speculum with the fingers, and pushed up with a moist sponge on a holder or a pledget of cotton in the dressing-forceps, until they reach the cervix. The cotton is then left in the speculum in order to prevent the escape of the leeches. The mouth of the speculum should be closely watched, as a leech may very easily slip out beside the cotton, and attach himself to some other portion of the patient's body near by which happens to be exposed, or fall on the floor and, if the animal has already drawn blood, soil the carpet. As a rule, leeches bite very readily at the cervix. If they do not, a few slight punctures of the cervix will draw blood enough to attract the leeches. After a few minutes it is well to remove the cotton, and see whether the leeches have bitten. A slight pain, and a drawing, unpleasant sensation in the pelvis are all the patient feels of the bite. Generally not more than three or four leeches are applied, because these will remove all the blood required, and no more have room in the speculum. Each

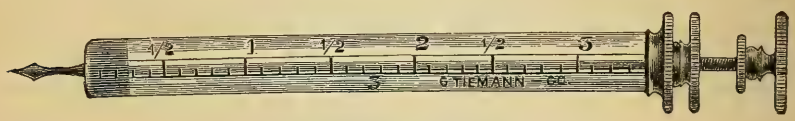


Fig. 161.—Reese's Artificial Leech.

leech draws on an average half an ounce of blood, and two ounces are probably as much as need be taken at each sitting. Besides, the loss from after-oozing may amount to an ounce or two more.

When a leech is satisfied it loosens its hold and is removed from the speculum by depressing its mouth, and sliding the leech into a cup or bowl, together with whatever blood has escaped. Thus leech after leech is removed. Generally fifteen to twenty minutes will suffice to complete the operation, if every leech takes prompt hold. This they often fail to do, and the operation may be greatly delayed thereby. When a leech once refuses to bite, the chances are that it will not be induced to do so, and a fresh one had better be substituted.

When the leeches have all been removed, the blood is mopped out of the speculum and the cervix examined, to see whether any larger vessel has been opened, or the bleeding is profuse. If so, an alum or tannin pledget may be placed over the cervix. If slight, the speculum is withdrawn, and the patient directed to check any excessive secondary hemorrhage by astringent injections, and in case of need send for the physician. Leech-bites are often followed by more or less profuse oozing for several hours, and while this is one of the advantages of this method of depletion, it should not be allowed to continue so long as to weaken the patient. If the oozing is too slight, tepid injections should be ordered. The application of leeches should always be made at the home of the patient.

Unquestionably, the suction action of the leeches draws more blood

from the uterine vessels than is obtained by mere sharp punctures. In acute inflammations, and when the hyperemia is excessive, this suction and the secondary oozing are desirable. But the question is whether in chronic hyperemia the influx of blood into the momentarily unloaded veins is not increased by the suction of the leech, and the benefit of the application counterbalanced. So much is certain, that when we want a thorough disgorgement of the blood-vessels, the leech is the proper agent. The instrument shown in Fig. 161 is intended to act as a substitute for the leech. The cervix having been punctured with the lance-shaped needle, the latter is withdrawn, the suction-tube screwed down, and the piston drawn back. I do not think this contrivance has become popular. The inconvenience attending the employment of leeches, the length of time required, their expense (a matter of some importance to poor patients), and the danger of the bites bleeding too long, all these objections have led to the popularization of another method for depleting the uterus and adnexa, namely,

Scarification.—This may be either superficial or deep. If superficial, the incisions are made with an ordinary long-handled, sharp-pointed bistoury, which is thrust into the tissue of the intra-vaginal portion of the cervix, to the depth of one-eighth of an inch, or with which the cervix is

Fig. 162.—Buttles' Scarificator.

gashed in a radiating direction from the os, outward; five or six or more such incisions may be made. Relief of tension, splitting of occluded mucip-arous follicles (ovula Nabothi), and quite free bleeding, especially from the cuts near the os, result from these incisions. To gash the cervix in all directions with a dull-pointed curved knife seems to me unadvisable, because the incisions are not deep enough to draw much blood, and because the linear cicatrices resulting will after a while contract and disfigure the mucous membrane covering the cervix.

If deep incisions or punctures are desired, a fine-pointed bistoury may be used, or, what is better, a regular scarificator with lance-shaped point as shown in Fig. 162. This needle is thrust into the cervical tissue, to the depth of one-fourth to one-half of an inch, and even more, care being taken to keep parallel with the cervical canal in order to avoid wounding the parametrium. As many as twenty such punctures may be made each time, not all going so deep as one-half of an inch, in proportion to the size of the cervix and the amount of blood desired and obtained. The flow of blood from scarification is by no means as great as from leech-bites. I have frequently obtained no more than one ounce from at least twenty punctures. To increase this flow, the scantiness of which depends partly upon the failure to wound larger vessels, and partly upon the absence of suction-force to draw the blood down from more distant channels, various contrivances have been devised. The dry cupping-tube of Thomas, and

Reese's artificial leech (Fig. 161) illustrate the principle of these instruments. The former is to be applied to the cervix both before and after scarification, precisely as a cupping-glass draws the blood first into the skin, and then out of the incisions which have in the interval been made in the hyperemic tissue by the cupper. Although the idea is an ingenious one, the practice has not, so far as I am aware, been generally adopted, although the instrument is figured in every work on gynecology. Injections of warm (not hot) water are almost always needed after scarification to increase and maintain the flow for a few hours at least.

Besides the mere withdrawal of blood, scarification and puncture exert an exceedingly favorable influence on uterine congestion by unloading the numerous little muciparous follicles which stud not only the surface of nearly every hyperplastic uterus, but often extend some distance up the cervical canal. These little glands, if at all prominent, feel to the examining finger like shot buried under the mucous membrane, and are a constant source of irritation of the cervix, and thereby of the whole uterus, constituting a variety of disease known as cystic hyperplasia of the cervix. If very large and numerous, their peculiar nodular feel may even simulate carcinoma, from which their softness chiefly distinguishes them. On the surface they appear to the eye as small semi-opaque dots, from which on puncture a drop of viscid, glairy mucus oozes. The puncture of these follicles, which are nothing but minute retention cysts—indeed the destruction of their wall by a cutting or twisting motion of the scarificator—rapidly reduces an engorged cervix. They are particularly numerous in eversion of the endotrachelian mucous membrane from laceration of the cervix, and unless thoroughly destroyed by repeated puncture will materially interfere with union after the operation of the laceration. Even the removal of the superficial layer of the cervical mucosa covering the everted lips, as is done during the operation, does not always destroy these cysts, since the cut may simply divide them in the middle, and leave one-half as a secreting surface between the lips of the wound. The glands must be obliterated by a thorough destruction of their walls, and carbolic acid, iodized phenol, or even solid nitrate of silver may be needed to accomplish this. Better a cicatrix, which can be entirely removed, than a hidden secreting surface. The puncture of these follicles may have to be repeated several times a week until all are destroyed.

Scarification of the mucous membrane of the uterine cavity proper is not quite so innocuous as that of the cervix, but it may be unavoidable when puncture of the cervix does not abstract sufficient blood. It is performed with a long hollow sound-shaped tube, from the side of the distal end of which a fine blade is protruded by a screw in the handle when the instrument is in the uterine cavity. By turning the blade about from side to side, the mucous membrane is gently incised as much as appears necessary. In obstinate amenorrhea, chiefly with hyperplastic uterus, this intrauterine scarification may be required, and prove very useful. In place of the knife, I have successfully employed the steel tampon-screw shown in Fig. 97, gently twisting the screw about in the uterine cavity, and thereby

lacerating the blood-vessels. Of course, care must be taken not to bore the point of the screw into the wall of the organ.

Scarification may be practised through any form of speculum, but the tubular is preferable, as it permits the more neat and convenient removal of the blood, which is allowed to flow or is mopped into a cup held under the mouth of the speculum. Unlike leeching, scarification may be safely and conveniently practised at the office or out-door clinic. It is not especially painful, although patients almost always feel every puncture, and some complain decidedly. But the operation is so short, and involves so little other trouble that they never object to this trifling pain. When I scarify at my office I usually insert a pledget of glycerine in order to prevent the blood from escaping and soiling the linen, and also to induce a watery discharge, and tell the patients to remove the cotton as soon as they return home, and promote the flow by tepid injections. Constant mopping of the cervix and removal of the blood from the speculum will aid the flow, but I generally find that very little escapes when the speculum is removed. It is well to tell the patients afterward that blood has been drawn, that they have been cupped, or the blood which might show itself during the day will alarm them.

The good effects of scarification in promoting a scanty menstrual flow often do not appear until several days later, the momentary discharge having entirely ceased in the meanwhile. Warm injections, foot-baths and sitz-baths are indicated in these particular cases until the regular flow appears. The injections should not be of *hot* water, which would contract the capillaries. No evil results have, to my knowledge, ever ensued from scarification properly performed.

X. INJECTION OF MEDICINAL SUBSTANCES INTO THE TISSUE OF THE CERVIX AND VAGINA.

Impressed with the idea that the injection of a few drops of alterative and stimulant agents into the tissue of the cervix itself might prove as beneficial in chronic hyperplasia of the cervix and body of the uterus as it does in chronic hypertrophy of the tonsils, I had a long hypodermic needle made several years ago, and began to experiment on a few appropriate patients in my clinic. I happened to have a few very intractable cases of general areolar hyperplasia, as indeed is generally the case, and I determined to see whether the patients would endure and be benefited by injecting tincture of iodine or fluid extract of ergot, which seemed to me the most suitable drugs, deep into the tissue of the cervix. Accordingly, at alternate visits of one week apart, I injected five drops of iodine and five drops of a hypodermic solution of ergot (one grain of Squibb's solid aqueous extract of ergot to two minims of water) deep into the cervix, plunging the needle at least one-half inch deep into the tissue straight upward toward the internal os, and slowly expressing the fluid. The injections were made in the out-door clinic, and but little pain was complained of at the time. The patients were allowed to return home a short time after the

injection. Soon after I began the practice, I chanced to speak of the plan to Dr. Wm. T. Lusk, and was informed by him that the same idea had been carried out some years before in Bellevue Hospital by one of the internes, and that the result had been a post-mortem for peritonitis. I still persisted, however, until I had given three injections of iodine and ergot alternately to each of four patients, when one injection of iodine produced such violent pain and para-uterine tenderness that I became alarmed, not wishing to meet with the same results as the Bellevue gentleman. The patient recovered under rest in bed and hot fomentations, but I decided to defer my experiments with this method, and have not since recommenced them. In no case was there any improvement in size of uterus or symptoms noticeable.

While I was making this trial, and anticipated from its painlessness that good results might be achieved, Dr. J. M. Bennett, of Liverpool, reported an almost identical method in chronic cervical metritis. He used a solution composed of grs. xx. each of iodide and bromide of potash, one-half drachm tincture of iodine, two drachms of water and glycerine, and injected a few drops in five or six different spots, according to the size of the cervix. Scarification of the cervix preceded the injection. No reaction was observed in any case. Three operations were generally sufficient, and he effected many cures by this method. As soon as the immediate effect of the injection had passed away the cervix was dilated by a sponge-tent.

Dr. L. J. Collins, of Guilford, Ind., has also recommended the same treatment, using a solution of ergot, two and a half grains to the injection, a pledget of cotton soaked in chloroform having first been placed to the cervix as an anesthetic. He reports excellent results, making the injections every five or six days, for two to three months. The patients were kept in bed for twenty-fours hours after. No unpleasant reaction ensued in any case.

Dr. Delore, of Paris, reported sixty-three cases in 1877 of ergotine injections into the uterine tissue ; the solution used was of a strength of 1 : 2. The patients were frequently seized with nausea, chills, vomiting, and pain in the head, back, and abdomen, which lasted from four to twenty-four hours. Twice an abscess occurred in the cervix, once a pelvic cellulitis. The results were certainly not as satisfactory as those obtained by hypodermic injections of the same drug ; still, hemorrhage was soon arrested, tumors ceased to grow, and the general health of the patients improved.

Encouraged by these reports I have been endeavoring to make up my mind to resume the injections. The only difficulty against practising them in an out-door clinic is that I deem it absolutely essential to safety that the patient should remain in bed for at least twenty-four hours afterward. If positive benefit both as regards the symptoms and the diminution in size of a subinvoluted or hyperplastic uterus could be hoped for from these injections, they certainly should be given a fair trial, since so little real good can be done these cases by the means hitherto at our disposal.

Injections into the substance of the vaginal wall for malignant disease

and for the deposits of chronic pelvic cellulitis have been made by Dr. Wm. M. Chamberlain, of New York. He uses an alcoholic solution of bromine (1 : 5), injecting five drops into the neoplasm every two or three days, and reports decided shrinkage of the tumor. I am not aware that this practice has been followed by other operators, nor whether its success entitles it to commendation.

A solution of chloride of zinc (1 : 5) may be injected into the parenchyma of a cancerous cervix for the purpose of producing sloughing of a portion of the growth. Five to ten drops may be injected one-fourth to one-half an inch deep. This should be done at the home of the patient and precautions taken against possible hemorrhage from erosion of a vessel during separation of the slough. Such an accident happened to me on one occasion, and the patient lost considerable blood before I reached her and tamponed the vagina. Pure carbolic acid may be injected for a like purpose, and in the same manner; this agent acts besides as a local anesthetic. An erosion of a vessel is not to be feared from the sloughing after the carbolic acid injection.

The injection of escharotics into a fibroid tumor is not advisable; the danger of septicemia by far outweighs any advantage in shrinkage of the tumor which might possibly ensue.

XI. REPOSITION OF THE DISPLACED UTERUS AND OVARIES.

As a rule, every dislocated uterus should be replaced whenever its dislocation gives rise to symptoms, or a supporter is to be introduced to maintain it in its normal position.

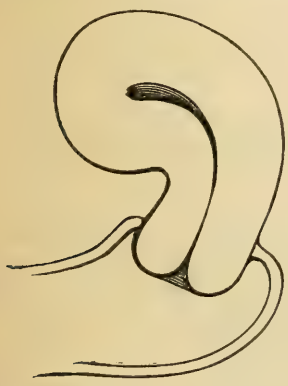


Fig. 163.—Anteflexion of Uterus, First Degree (P. F. M.).

Fig. 164.—Anteflexion of Uterus, Second Degree (P. F. M).

The replacement of an anteverted or anteflexed uterus is an easy matter, but as soon as the support of the replacing finger is withdrawn the fundus at once falls forward again through its weight and normal inclination in that direction. A complete, and so long as the patient retains the dorsal position, permanent replacement can be obtained only by retroverting the uterus by manual or instrumental measures.

In lateral displacements the reposition is rarely possible except by force, for the reason that these dislocations are generally due to inflammatory contraction of the broad ligament of the side toward which the fundus inclines. Only by gradually stretching this adhesion can a restoration to the median line be effected.

In retro-displacements the fundus can be restored with more or less facility, unless it is bound down by intra-peritoneal adhesions. In this class of dislocations the uterus once replaced, of course, assumes the normal, slightly antecurved position (see Fig. 14) and will then retain this position so long as the patient does not rise ; in rare instances when the displacement was the result of recent physical shock, the retention may be permanent. Usually, the fundus falls back again as soon as the erect

FIG. 165.—Anteflexion of Uterus, Third Degree (P. F. M.).

FIG. 166.—Degrees of Anteversion of Uterus, First and Second. The solid outline is the normal position (P. F. M.).

posture is assumed and the abdominal viscera press down on the uterus. In downward displacement, prolapsus, the replacement is also an easy matter, as soon as intra-abdominal pressure is suspended in the dorsal or knee-chest position.

The reduction of an inverted uterus can scarcely be considered to belong under minor surgical gynecology, as it is generally a difficult, severe, and protracted operation. I include it here for the sake of completeness, without intending to give the minute details of all the methods now employed for the purpose.

A displaced uterus can be restored to its normal position either by the aid of the fingers, or by gravitation and atmospheric pressure, or by instruments.

By the Fingers.

Ante-displacements.—To replace an anteverted or anteflexed uterus, it is but necessary to put the patient in the dorsal recumbent position with elevated thighs, pass the index finger into the anterior pouch of the vagina and gently press the fundus upward and backward until the exter-

nal hand can be pressed into the abdominal wall between symphysis and uterus, and aid the retroposition. As soon as the fundus is steadied by the external hand, the internal finger slips behind the cervix and lifts it upward toward the symphysis, thereby carrying the fundus into retroversion. This replacement is, of course, merely temporary, unless maintained by a pessary or the prolonged dorsal decubitus. If the fundus should be bound down by adhesions to the bladder, as occasionally occurs, the replacement will not succeed. In anteflexion, also, a straightening of the uterine axis will be achieved by digital efforts only when the distortion is recent and in a flabby uterus. In congenital or chronic anteflexion, in which the uterine tissue at the angle of flexion has become cicatricial or

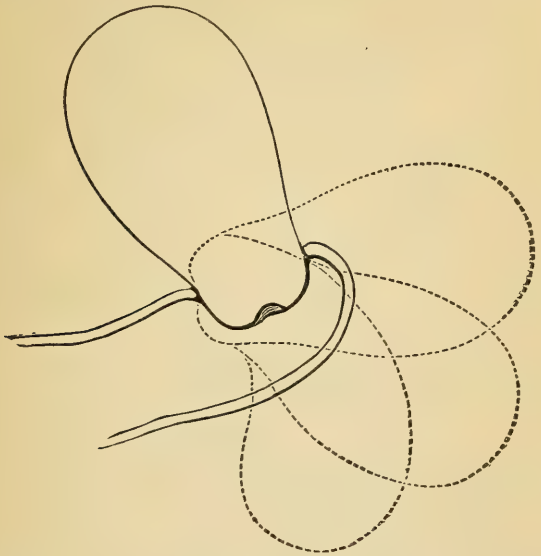


FIG. 167.—Degrees of Retroversion of Uterus, First, Second, and Third. The solid outline is the normal position (P. F. M.).

hypertrophic, a replacement will usually be possible only by the aid of instruments. The external hand affords most valuable assistance in lifting up and steadying the fundus.

Anterior displacements, in my opinion, are neither so productive of distress nor so curable by treatment as the backward dislocations.

Lateral displacements can be rectified also by the vaginal finger and external hand, provided the adhesions to which these displacements are due are not too firm. Unfortunately this is generally the case, and the uterus may be restored to its normal position only to snap back to its displacement when the pressure or traction is removed.

Retro-displacements are by far the most common of the deviations of the uterus requiring rectification. The displacement may be restored either on the back, side, or in the knee-breast position.

When the patient lies flat on her back, the retroverted or retroflexed

fundus can be lifted up by the middle finger, while at the same moment the index pushes the cervix back toward the sacral excavation. As soon as the fundus rises to the level of the promontory of the sacrum the external hand seizes it and draws it forward, the internal finger keeping up its backward pressure on the cervix. This maneuvre will usually succeed if the uterus is not too heavy, too sharply retro-displaced, especially retroflexed, and if the cervix projects sufficiently into the vagina to afford a handle for the replacing finger. In the case of a uterus with a short intra-vaginal portion of the cervix the long lever (body and fundus) so far exceeds the short lever (cervix) as to render a replacement on the back almost impossible by digital efforts. Such cases also afford but little chance for retention by a pessary.

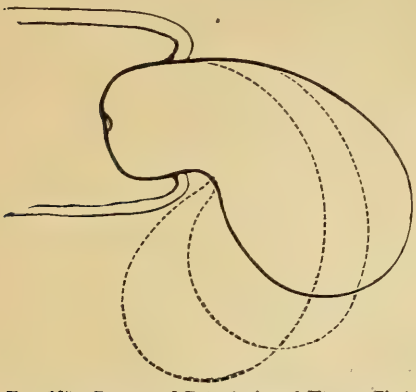


FIG. 168.—Degrees of Retroflexion of Uterus. First, Second, and Third. The solid outline is the first degree (P. F. M.).

When a retro-displaced uterus is not easily replaceable in the dorsal position, and this very often occurs, the best method is to place the patient in the left semi-prone decubitus, in which a moderate amount of gravitation away from the pelvis is obtained and intra-abdominal pressure is somewhat diminished. The clothes should be loosened about the waist. The operator then stands behind the patient, facing her head, introduces the index and middle fingers of his right hand into the vagina and carries them, with the palmar surface backward, behind the cervix into the posterior vaginal pouch. He now pushes up the displaced fundus gently but firmly, following up each advantage steadily, but using no active force, and always keeping the fingers pressed against the posterior wall of the uterus. This upward pressure may be made at intervals, or continuously; and occasionally a few quick pushes may be added in the hope of bounding the fundus above the promontory. The pain experienced during this maneuvre may be trivial, or quite severe if the uterine body is congested and tender. Besides, the pressure against the perineum, which is forced up to the utmost by the operator's fingers, causes some pain both to the latter and the patient. When the fundus has been so far elevated as to be on a level with the promontory, and requires but a slight impulse forward to accomplish the replacement, the index-finger quickly seizes the anterior aspect of the cervix, while the middle finger still supports the fundus, and gently but firmly draws it backward; while this is being done the middle finger also seizes the cervix, and both together force that part as far as possible into the sacral excavation. The fundus being thus propelled forward often falls with a jerk, as it were, into anteversion. Especially does this occur if the organ is heavy and the ligaments lax. Some gynecologists employ the left hand for this maneuvre, the operator facing the pa-

tient's genitals and inserting the two first fingers of that hand behind the cervix and proceeding precisely as described for the right hand. It is true that with the left hand a much greater leverage can be exerted on the dis-

FIG. 169.—Replacement of Retroverted Uterus by two Fingers of Right Hand, with Patient in the Left Latero-abdominal Position. First step (P. F. M.).

placed fundus uteri, as any one can easily satisfy himself by trial, and I have repeatedly succeeded in raising the impacted fundus out of the sacral excavation by the fingers of the left hand, when the right had failed. But the backward traction of the cervix with the left index is not so easy, and all in all, I prefer the right hand for the operation. Of course the patient may be placed on her *right* side, if the operator prefers, and the left hand be then used, as described for the right.

FIG. 170.—Replacement of Retroverted Uterus, by Right Hand, Patient on Left Side. Second step (P. F. M.).

Often it is impossible to replace the uterus in this way, the fundus being adherent, or the broad ligaments thickened, or the cervix short. The uterus will then remain retro-curved, or straight, and must be entirely

anteverted in the knee-chest position, or by pressure through the rectum, or by instruments.

If sufficient purchase is not obtainable on the fundus through the vagina, the two fingers of the right hand may be introduced into the rectum and pressure exerted on the fundus from that passage ; or, what may perhaps be more convenient now, the operator stands directly at the feet of the patient and inserts the first two fingers of his left hand into the rectum, the palmar surface of which now presses against the anterior wall of that canal and exerts a well-directed and systematic pressure on the fundus. The thumb of the same hand meanwhile enters the vagina and draws the cervix backward. This method, of all the manual devices, is the most efficient.

A fundus which cannot be replaced by either of these maneuvres must be firmly incarcerated below the sacral promontory, or too tender to per-

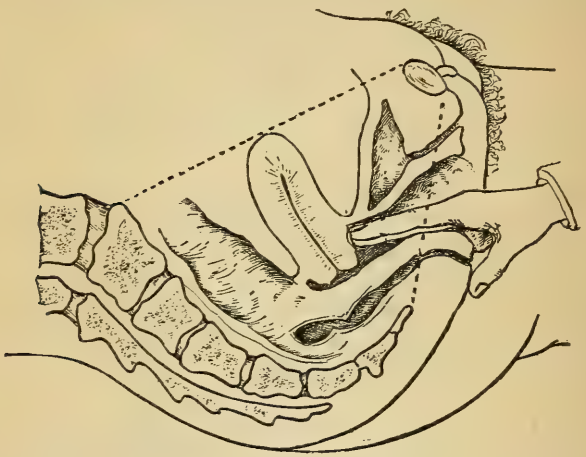


Fig. 171.—Replacement of Retroverted Uterus, by Right Hand, Patient on Left Side. Third step (P. F. M.).

mit effectual pressure ; or it is adherent to the anterior wall of the rectum. This often happens in old displacements, when the utero-recto-sacral ligaments have become shortened by inflammatory contraction or disease ; or the uterus is sharply retroflexed and very flabby ; or the body is much enlarged, as in early pregnancy ; or there has been pelvic peritonitis. A condition closely simulating, and doubtless often taken for, adhesion is impaction of the fundus uteri between the contracted utero-sacral ligaments, which can be felt grasping the organ on either side. Steady pressure will usually, after a time, overcome this resistance and permit the elevation of the fundus.

If this vaginal and rectal pressure fails, the attempt may be made to replace the uterus in the knee-chest position. The two first fingers are passed behind the cervix, and the fundus is alternately pressed forward and downward, and the cervix pushed backward. The elongation of the vagina in this position somewhat interferes with this maneuvre, and a sponge on a long holder, or a vaginal depressor, may be employed to push

up the fundus in place of the fingers. The most powerful replacing force is exerted by the fingers or sponge-probang in the rectum, the thumb, if possible, drawing back the cervix. A uterus which resists this pressure will probably require the most forcible instrumental measures for its replacement.

I have generally been able to replace a retroversion or retroflexion by the fingers, per vaginam or rectum, in the semi-prone position, as above described. Some operators prefer the knee-breast position for all cases; and no doubt the assistance of gravitation, to which may be added that of atmospheric pressure when the vagina is opened, is of great advantage in effecting reduction. When the fundus is too firmly impacted or too tender for replacement on the side, I always employ the knee-breast position and atmospheric pressure before resorting to further manual efforts.

The frequent replacement of a dislocated uterus is in itself a valuable method of gradual cure by restoring tone to the ligaments, and giving the vagina the proper shape for a supporter.

A prolapsed uterus is easily replaced by putting the patient in the dorsal recumbent position, and pressing up the organ with one or more fingers, if it be descensus of the first or second degree (not beyond the vulva), and with the whole hand or both hands, if of the third degree (complete prolapsus). If the whole uterus is outside of the vulva, the vaginal walls being inverted with it, the procedure is as follows: The prolapsed mass is well oiled or greased, and the lower portion of the cone grasped in the tips of all the fingers of one hand, and gently and gradually pressed upward until the cervix is within the vulva and the whole vagina has been reinverted. If the organ is very turgid, it should be grasped in the whole of both hands and gently compressed, so as to squeeze the blood out of it, before attempting to return it. Or cold-water applications may be made to it until it shrinks and its surface wrinkles. A uterus which in its prolapsed condition measures five or six inches in length will, on replacement, be found to have contracted to three or four inches; this phenomenon is due to a peculiar (histologically, as yet unexplained) putty-like ductility of the cervix. Frequently the uterus, when replaced, is found to be retroflexed below the promontory, retroversion being the natural precursor and companion of prolapsus.

Should a prolapsed uterus resist replacement in the dorsal position, the knee-chest posture should at once be assumed, and the effort repeated, when no doubt it will be successful. I have met with no case in which I found it necessary to use more than the simple means related.

I shall describe the replacement of an inverted uterus by manual and instrumental measures in the same section later on.

By Gravitation and Atmospheric Pressure.

A displaced uterus, if movable and not fixed by adhesions, may, under favorable circumstances, be entirely replaced by gravitation and atmospheric pressure without the aid of manual efforts. This applies both to ante- and retro-displacements, and to the two first degrees of prolapsus.

If we wish to replace an anteverted or anteflexed uterus by these means, it will be necessary for us to put the patient in a position in which gravitation will take place away from the pelvis toward the diaphragm, and intra-abdominal pressure toward the pelvis will be decreased. This is obtained by elevating the patient's hips and leaving her head and shoulders on the couch; in proportion to the elevation of the hips will the effect be increased. Dr. Verrier, of France, has recently reported a contrivance of his for the systematic replacement of ante-displaced uteri by gravitation and posture, which consists of two rope ladders, upon the rounds of which the patient places her feet, ascending, until the proper elevation for relaxation of the abdominal wall is found, while her trunk occupies a recumbent position on the floor. The hips are supported by a cushion. In this position the intestines glide in front of the uterus and the anteversion is replaced. By exercising the pelveo-abdominal muscles through lifting herself up by a pair of elastic hand pulleys, also attached

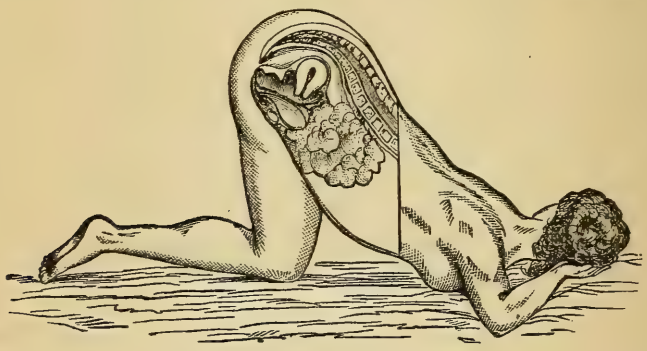


FIG. 172.—Knee-chest Position, showing Displacement of Uterus and Intestines; Vagina Closed (Campbell).

to the ceiling, the circulation is stimulated. Daily sittings will ultimately result in permanent replacement, the author says.

With us it is not found necessary to resort to posture to replace an anteverted uterus. The knee-breast posture certainly would not answer, as it would only aggravate the anteversion. The genu-pectoral position is chiefly employed for the replacement of a retroverted uterus, and its development into a systematic method, with the assistance of pneumatic intra-vaginal pressure, is due mainly to the efforts of Dr. Henry F. Campbell, of Augusta, Ga. Others independently hit upon the same principle, as Solger, of Berlin, and myself (who in my office accidentally replaced a retroverted gravid uterus which had resisted all the methods above mentioned, by elevating the perineum with Sims' speculum in the knee-chest position, and thus expanding the vagina with air), but to Campbell is due the credit of having thoroughly worked up the subject. His explanation of the method of replacement is illustrated by Figs. 172 and 173, taken from his article. In Fig. 172 the uterus is retroverted, and the intestines are crowded down into the pelvic cavity, leaving a free space between the upper border of the intestines and the diaphragm. This vacuum is, of

course, imaginary, and exists only momentarily while the instantaneous change represented in Fig. 173 takes place. Here we see the intestines all prolapsed toward the diaphragm, the vagina dilated (I have added a Sims' speculum to show the elevation of the perineum) and the uterus replaced, that is, anteverted. The forces which achieved this result are—1, suspension of intra-abdominal pressure, and consequent traction on the pelvic viscera, *vis a fronte*, and 2, intra-vaginal atmospheric pressure, *vis a tergo*. The former action is a suction force on the pelvic organs, which is compensated for by the rush of air into the vagina. The position alone might effect the replacement, but it is materially aided by the air-pressure, which acts in the same manner as the fingers in lifting up the fundus.

That all retro-displacements can be replaced in this manner, as Campbell claims, has certainly not been my experience. I have found numerous instances in which the fundus remained wedged into the sacral ex-

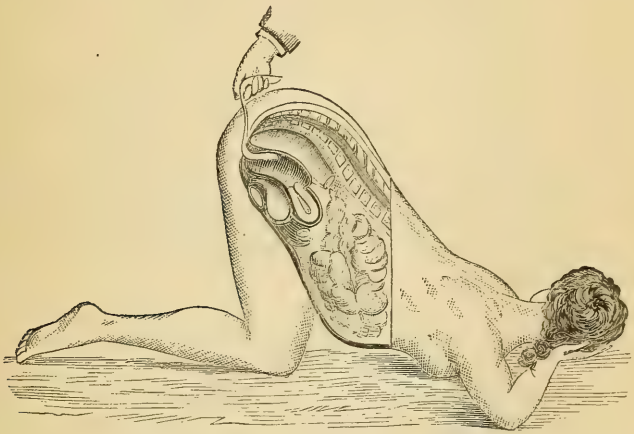


FIG. 173.—Replacement of Retroverted Uterus in Knee-chest Position and by Air-pressure (Campbell).

cavation, no matter how forcibly the perineum was elevated and the vagina expanded. The slight impulse given to the fundus by the finger or depressor, however, sufficed to dislodge it and to bring the two natural forces into play. Or the fundus might be dislodged by seizing the cervix with a tenaculum and carrying it backward toward the sacrum. This manipulation of the cervix also answers a good purpose in the lateral position, when the fingers do not readily succeed in elevating the fundus.

The heavier the body of the uterus is, the more readily will it be replaced in the knee-breast position, hence the special utility of this position in retroversion of the gravid uterus.

When the displaced fundus refuses to become dislodged, a very effectual and comparatively painless auxiliary consists in a rubber bag (Barnes' or Braun's) inserted into the rectum until it touches the uterus and then inflated or filled with warm water. When the fundus has been sufficiently raised the bag is removed, and the distention of the vagina, or

what is often more effectual still, that of the rectum, with air, will usually complete the reposition.

Dr. Campbell recommends the frequent employment of the genu-pectoral position and air-pressure by the patients themselves at their homes, and obtains the admission of air into the vagina by teaching the patients how to separate the labia with the fingers when they have assumed the position, or by means of a small tube, like a leech or test-tube, open at both ends, which the patient inserts into her vagina. After remaining in this position for some minutes the patient turns on her side and remains in the latero-abdominal position for some time, a few hours or longer. In order to prolong the replacement of the uterus and relaxation of the pelvic ligaments as much as possible, Campbell advises that this method should be practised every evening on retiring, the patient remaining in the side position during the remainder of the night. In this way, he claims, the ligaments gradually regain their tone, and in course of time a cure may be obtained. The facility of this practice recommends it very highly. I have been in the habit for several years of directing my patients with retro-displacements to assume the genu-pectoral position and separate the labia several times a day, and have certainly heard good reports as regards relief from backache and bearing down from it. The fitting of a pessary is also facilitated by this frequent reposition of the uterus and expansion of the vagina; and a slightly displaced pessary may be spontaneously replaced, and the pressure on the posterior wall of the uterus and the retro-uterine tissues by the pessary relieved by daily employment of the same method.

By Instruments.

When a displaced uterus cannot be lifted up and straightened by the measures above described, the replacement may, if it be imperative, be accomplished by means of instruments.

It should be distinctly understood, however, that the difficulty is probably due to adhesions, and that such a replacement, after the ordinary means fail, is justifiable only by the severity of the symptoms, and should be looked upon as an operation. This holds good for those cases in which the fundus is unquestionably adherent, and in which a rekindling of the affection which caused the adhesions, viz., a pelvic peritonitis, is greatly to be feared. But there are numerous cases where the uterus is so much flexed, or so heavy, or so flabby, or the fundus is impacted between the utero-sacral ligaments (chiefly retroflexion and retroversion), or where it is desired to carry it into the opposite displacement, that the fingers and position alone are unable to accomplish the reposition. Here, adhesions and other counter-indications to the use of intra-uterine instruments being absent, the replacement by means of a sound or instrument specially constructed for the purpose, is no very serious matter, if gently and carefully performed.

The uterus can be replaced by gently passing the sound in the direc-

tion of the curve of the uterine canal (in ante-displacement with concavity forward, in retro-displacement with concavity backward—see Figs. 166 and 167), up to the fundus, and then very gently rotating the sound until its concavity points in the opposite direction. In this movement the rotation should be chiefly with the handle of the sound, the point is merely turned on its own axis, describing but a very slight curve and thus exerting almost no force on the endometrium. The curve of the uterine canal has now been reversed, but the uterus itself is not entirely replaced. This is done by depressing the handle of the sound gently until it touches the perineum, in retroversion, and by elevating it to the symphysis in anteversion. The fundus will then always be carried in precisely the opposite direction from the handle.

Frequently this maneuvre is less painful and difficult than the manual reposition of a tender, congested, retroverted, or sharply retroflexed uterus. If gently done, it need give no, or but little, pain, and produce no reaction, perhaps merely the discharge of a few drops of blood.

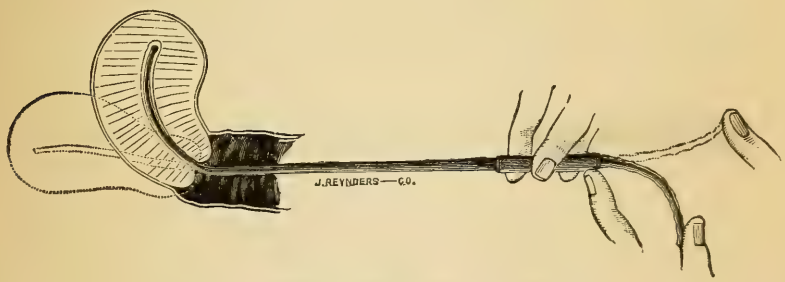


Fig. 174.—Jennison's Uterine Sound and Repositor.

I have frequently employed the ordinary Simpson sound, and have never met with the slightest evil result. But, when the uterine canal is sufficiently patent, I should certainly advise a thicker sound, such as Peaslee's (Fig. 60); or a sound with a circular plate at about two and one-fourth inches from the tip might be used, upon which plate the cervix rests and which prevents the point from touching the fundus. An injury to the fundus can be produced only by gross violence or in a diseased uterus.

The force used in this maneuvre is gauged entirely by the touch of the operator, and upon his skill and caution depends the avoidance of injury. In order to prevent this variable force, special instruments for reposition have been contrived, which replace the uterus either by gradual action through a screw-mechanism, or rapidly by a hinge-process. An instrument of the former variety is that of Elliot, which is introduced curved and straightened by the screw in the handle, if it is desired to merely straighten a flexion, or introduced straight and then curved in the respective direction, if an anteversion is to be converted into a retroversion, or the reverse.

A very ingenious sound and repositor is that of Jennison, shown in Fig. 174. It is made of steel spirals so jointed that when the lower end

of the sound is pressed down the upper end turns upward in proportion, and *vice versa*. It can thus be made to enter a flexed uterus very easily, and the handle being then pressed in the opposite direction the uterus is reversed, entirely in proportion to the amount of curvature of the handle.

Instruments of the second class are the repositors of Emmet and Sims, the former of which is shown in Fig. 175. The difference between them is only that the stem of Emmet's is jointed so as to admit of its easy passage through a flexed canal, while that of Sims is in one straight piece. The stem is so attached by a hinge to the shank of the instrument, that when the point is near the fundus, as shown by the broad plate touching the cervix, by a rotation of the stem within the uterus and the pushing of the instrument into the anterior or posterior vaginal pouch (anterior, if an anteflexed uterus is to be retroflexed ; posterior, if a retroflexed uterus is to be anteflexed) the fundus will be raised and carried in the opposite direction. It is necessary to turn the instrument, if Emmet's is used, in order to bring the inside of the hinges toward the direction to which the uterus is to be carried. This rotation is an objection to Emmet's repositor, because the endometrium is easily lacerated by the joints. In this respect that of Sims is preferable, but the latter is difficult to pass through

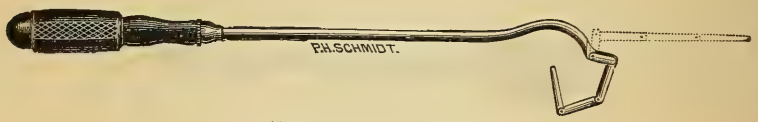


Fig. 175.—Emmet's Uterine Repositor.

a sharp flexion. I formerly used these repositors quite often, but of late years have succeeded quite as well with the thick sound in the comparatively few cases in which forcible instrumental reposition was required.

These instruments may all be used in the dorsal position without the aid of a speculum, being introduced according to the rules given for the ordinary sound, or they may be inserted in the semiprone position through a Sims speculum. If the latter, the cervix should be seized with a tenaculum, and the uterus drawn down and straightened as much as possible, before the repositor is introduced. When the replacement is about to be effected, the operator should, with his left hand, seize the speculum from the nurse, she still lifting the superior labium, and gently follow with the point of the speculum the direction given to the fundus until its position is reversed. By so doing the fixation of the uterus by the backward traction of the speculum is temporarily suspended, and undue force avoided. When the organ is replaced, the speculum is handed back to the nurse. This rule applies chiefly to retro-displacement.

It will be stated in the proper place that a displaced uterus should *always* be restored to its normal position before a pessary is applied. This replacement should be, if possible, and in the large majority of cases can be, effected by one of the non-instrumental methods described, chiefly that with two fingers in the left latero-abdominal position, which I have found

the best method. The practice of some gynecologists to elevate the uterus with the sound, and then pass the pessary into position over the sound, is decidedly reprehensible and unnecessary. A uterus should *never* be replaced by an instrument until repeated manual and postural attempts have failed. In order to ensure retention of the replaced organ until a pessary can be applied for permanent support, a position should be maintained in which gravitation favors such retention : in ante-displacement with elevated hips, in retro-displacement and prolapsus, the latero-abdominal or genu-pectoral positions.

I wish to particularly impress the axiom, that instrumental, forcible, reposition of a displaced uterus is justifiable after the non-instrumental methods fail *only* when the dangers possibly arising from such forcible reposition are clearly understood, and the symptoms call for interference. Such cases are chiefly those of retro-displacement; an anteverted uterus rarely becomes adherent. Under certain circumstances, when the adhesions are old and lax, and the parametrium is not at all tender, and when the necessity for replacement is imperative, an attempt may be made to gently, steadily, and forcibly antevert the uterus with one of the above instruments; this is done with the distinct intention of stretching or tearing the adhesions, and, therefore, with the knowledge of the danger of such a practice. This is an *operation*, and should always be performed at the house of the patient, under anesthesia, and the patient should be kept in bed for three or four days or longer, until all chance of peritonitis has passed.

Dr. A. F. Erich, of Baltimore, has recently operated on several such cases with success, using a stout steel sound with a circumference of 36 mm. at its tip. The anterior wall of the rectum should be held back by fingers, or a thick bougie in that passage, or else it will be lifted up, and the adhesions remain untorn. I myself have had one similar and highly successful case. A more gentle, but certainly less certain method is that of Kuechenmeister, by passing a rubber bag into the rectum and distending it with water, leaving it there as long as the patient can bear it. This is to be repeated every day until the uterus is replaced, or the rectum becomes too irritable. The exercise of force in elevating a retroverted and adherent uterus cannot be too severely deprecated. Although the replacement of such an organ is to be ardently desired, the dangers attending the operation have deterred the majority of gynecologists from attempting it. It is to be hoped that time will bring us an efficient and safe remedy for these intractable cases.

It should be understood that fixation of the uterus to a greater or lesser degree by plastic exudations into and subsequent contraction of one or both broad ligaments, or the parauterine cellular tissue, does not belong properly under the head of the corporeal and fundal intraperitoneal adhesions above spoken of. Cellulitic fixation or displacement is not, as a rule, amenable to forcible treatment or reposition. Fortunately, true adhesion of the fundus uteri is not as common as is generally assumed; at least, authorities like Sims and Emmet claim to have seen compara-

tively few cases in which the adhesion was unquestionable, and believe that a large proportion of the instances reported as such were merely cases of impaction between the utero-sacral ligaments. While I have frequently recognized the latter condition, I still have in my recollection quite a number of cases in which the body and fundus of the uterus were unquestionably adherent to the posterior surface of Douglas' pouch; the history of pelvic inflammation and the physical conditions agreed perfectly. In fact, I do not see how a case of retro-uterine pelvic peritonitis can produce any other result than adhesion between the two opposing surfaces of Douglas' pouch, and that such adhesions are by no means always entirely absorbed and the uterus again set free, is my conviction. Winckel, in his excellent photolithographic plates from nature, shows a number of specimens of such adhesions. Such attachments may be gradually stretched, by frequently repeated gradual elevation of the fundus uteri, if they are not too broad; but I have only once, as yet, dared to tear away the uterus from its broad adhesion, and then with complete success.

The replacement of the *prolapsed ovaries* is easily effected, unless they are adherent, by the manual and postural methods described for retroversion of the uterus. A proper retaining support should be introduced before the erect position is resumed, or the ovaries will at once glide down again, which, indeed, is too often the case, even with a pessary.

The *replacement of an inverted uterus* may be effected by manual and instrumental methods, both acting very much in the same manner, by exerting steady and continuous pressure on the inverted fundus. The chief difficulty is to overcome the resistance offered to the re-inversion of the fundus by the firmly contracted ring of the cervix. To dilate this ring by counter-pressure from above is quite as important as the upward forcing of the fundus from the vagina. All methods, therefore, seek to combine these two forces.

The methods are either such as are designed to effect rapid reduction, or such as attain their object by continued and gradual force. Either may be accomplished by manual or by instrumental efforts, or by both combined.

Of the methods for rapid reduction, those of Emmet, Barrier, Noeggerath, Courty and Tate (manual), White and Byrne (instrumental), are the most practical.

Emmet's method consists in grasping the whole uterus with the hand in the vagina, and with its palm forcing the fundus up while the fingers endeavor to dilate the cervical ring; the combined fingers of the other hand meanwhile exert steady counter-pressure on the ring through the abdominal wall.

Barrier also grasps the uterus in the whole hand, and forces the cervix up against the sacrum as a point of resistance, while the thumb presses in the fundus.

Noeggerath places the index-finger on one horn of the uterus, the thumb on the other, and endeavors to indent and re-invert first one corner and then the other; this having succeeded, central pressure on the re-

inverted cup is made, until reduction is completed. Counter-pressure is exerted in the usual way by the outer hand. This is an excellent method, and has achieved more results, probably, than any other. Thomas reports succeeding with it in three out of five cases.

Courty's method consists in passing the index and middle finger into the rectum, and hooking them through the anterior rectal wall into the cervical ring; the thumb of the same hand or the whole other hand then compresses and pushes up the fundus, while the two rectal fingers endeavor to dilate and draw down the cervical ring. The advantage this plan gives, if the ring can be firmly grasped, is apparent. A modification, and in point of efficiency, doubtless, an improvement is the method of J. H. Tate, of Cincinnati, who dilated the urethra, and introduced the index-finger of the left hand through the bladder into the cervical ring, and two

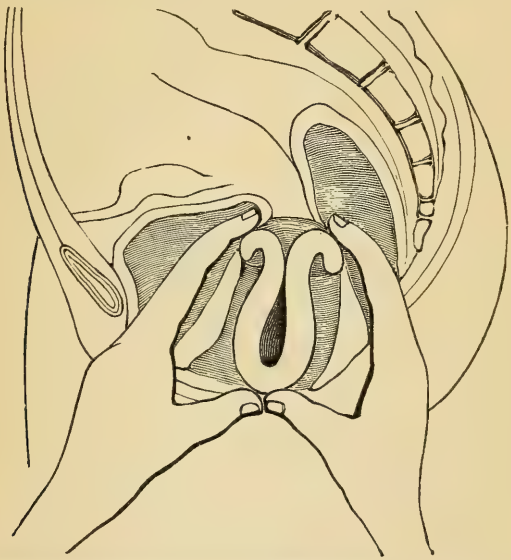


FIG. 176.—Tate's Method of Reduction of an Inverted Uterus. Diagrammatical (P. F. M.).

fingers of the right hand through the rectum also into the ring, and both thumbs against the cornua of the fundus in the vagina. By now dilating the cervical ring with the fingers of both hands, while the thumbs push up the fundus, the reduction of the inversion was inevitable. I am not aware whether any one but the inventor has used this method; he succeeded with it admirably in a case of forty years' standing after but half an hour's efforts (*Cincinnati Lancet and Observer*, March, 1878), completing the reduction by pushing up the fundus with a tallow-candle wrapped in a rag. To prevent return of the inversion, the external os was closed by a silver suture, which was removed on the third day. The patient recovered without any untoward symptom.

Theoretically, this plan would seem by far the most efficient of any. The disadvantage of dilating the urethra carries but little weight, compared with the great benefit to be derived from the double fixation of the

cervical ring. Besides, every patient whose inverted uterus is to be reduced is *eo ipso* put under an anesthetic ; the urethral dilatation, therefore, requires no previous preparation.

White's method consists in pushing up the fundus with a hard rubber cup attached to a stem and strong spiral spring which is pressed against the thorax of the operator, the vaginal hand steadying the cup while the outer hand exercises the usual counter-pressure and dilatation of the ring.

Byrne's instrument consists of a hard-rubber cup to fit over the fundus (of which there are three sizes), the largest two and one-half inches in diameter, in which a movable plate is fixed which can be slowly propelled forward by a screw in the handle. Another similar cup with a movable cone is placed on the abdomen over the cervical ring, and the cone advanced by means of a screw until it enters the ring. By now slowly screwing forward the plate in the vaginal cup, and exerting counter-pressure with the cup and cone on the abdomen, the fundus was entirely replaced in three stages within half an hour, in a case of inversion of nine days' standing which had resisted previous efforts at replacement. Thomas reports having employed the instrument successfully in one case.

The time required to replace a uterus by these rapid methods, may vary from a few minutes to several hours, if unsuccessful sooner, until in fact the operator is exhausted, or regard for the consequences to the patient of such long-continued force, and the length of the anesthesia, call for a postponement of the reduction to another day. Anesthesia is required in every case, both to relieve the unavoidable pain and to relax the tissues. The operator should have several trained assistants to relieve him when his strength gives out, as it often will ; both hands should be employed alternately. The uterus should have been softened by frequent hot vaginal baths for some time before the operation. If one attempt does not succeed, the patient should be put to bed, and all precautions adopted to prevent peritonitis ; and when this danger has subsided, a fresh attempt should be made, and so on until the reduction is effected, or its impossibility assured by any rapid method. Then, one of the means of gradual reduction should be employed, or if this fails, amputation may be called for. As a substitute for this last resort, Thomas has practised an operation which rationally is perfectly correct, but the boldness of which has prevented its being followed. He opened the abdominal cavity and with an instrument like a glove-stretcher dilated the cervical ring, while the other hand in the vagina pushed up the fundus. One patient recovered, the other died. In view of the recent favorable reports of ablation of the inverted uterus by the elastic ligature, completed by the knife, it seems scarcely likely that Thomas' method will find many followers.

The dangers from these manipulations are by no means inconsiderable. Peritonitis or cellulitis may follow the necessarily forcible handling of the uterus and adnexa, and these affections may terminate fatally or result in adhesions between the opposing uterine surfaces or fixation of the organ in its inverted position and consequent permanent impracticability of reduction.

When the reaction following efforts at rapid reduction gives rise to fears of such results, or when all forcible methods fail, the influence of gradual pressure against the fundus should be tested. The methods by which this may be performed are : elastic pressure by vaginal stem, and cup or bulb ; elastic pressure by vaginal water-bag combined with taxis, or by vaginal bag alone.

In the first method a cup (like that of White's or Byrne's repositors), or an olive-shaped bulb of hard rubber or wood, is introduced into the vagina and placed over or against the inverted fundus ; the stem is attached to a broad elastic belt, which passes between the thighs and is fastened before and behind by buckles, to a firm abdominal belt. By tightening this strap the pressure may be increased at will. Or the broad **T**-band may be replaced by four strong cords of elastic tubing or solid elastic, which pass up in front and behind, and are attached to the abdominal belt at either side of the median line. Counter-pressure should be exerted by a tight roll of cotton several inches in diameter, which is placed across the hypogastrium, immediately above the symphysis and kept there by a broad strip of adhesive plaster passed entirely around the body. To prevent the uterus from slipping to one side under the steady pressure of the cup, it is well to pack the vaginal vault around the uterus with carbolized cotton, before applying the cup. The pressure of the cup or bulb should be only very gradually increased, if at all. Steady, firm, gentle pressure against the fundus will tire out the contracted uterus more effectually than too much force.

Reduction by the gradual pressure of an elastic bag in the vagina is quite as sure a method as the above. If desired, the gradual pressure may be combined with daily kneading of the uterus with the hand. But the bag alone will often suffice. After packing the vaginal pouch with carbolized glycerated cotton, the bag is introduced, and filled with water. Thomas recommends retaining the bag by a broad strip of adhesive plaster which is attached to the abdominal wall near the navel in front, and to the lumbar region behind. Two holes are cut in it for the passage of urine and the tube of the bag. The latter may be still more distended, or relaxed, as the indication occurs.

An excellent method is that of Wing, who places against the inverted fundus a thick rubber ring (like a circular soft rubber pessary) and in this a rounded polished plug of wood about one and a half to two inches in diameter ; to the external end of this plug are attached four pieces of stout rubber tubing or cord crossing each other, which pass anteriorly and posteriorly between the thighs and are fastened to a broad belt around the waist. The rubber ring prevents the plug from slipping from the fundus, and the rubber cords exert steady elastic pressure inward and upward, and can be shortened at will. Wing reports several cases of old inversion reduced within twenty-four to forty-eight hours by this method, which differs essentially from that described above, in the ring whereby the plug is prevented from slipping.

It is not necessary, nor indeed feasible, to anesthetize the patient dur-

ing this trial of gradual pressure, because the pain is usually not very great if the pressure is but slight, and because the treatment lasts too long. In one case gradual pressure was exerted for eighteen days before the reduction was completed. The limit of trial of this method, therefore, depends entirely upon the endurance of the patient. It certainly is far safer than rapid reduction. Occasionally, the patient cannot endure the wearing, stretching pain of the dilated bags, or repositors, or inflammatory symptoms begin to show themselves, and then anesthesia and rapid reduction are called for.

Two other methods have been recommended, which act on a different principle from those described: that by repeated bathing of the uterus with cold water thrown forcibly into the vagina with a syringe through a speculum (one case of success is reported by Martin, of France), and that of Thomas, by encircling the uterus with a bandage of rubber sheeting. Both methods have for their object the compression and diminution in size of the uterus, and thereby its spontaneous re-inversion. In the one case in which Thomas' method was tried (a case of Dr. Robert Watts) the elastic pressure produced sloughing of the uterine mucous membrane and peritonitis, from which the patient recovered. The rubber bandage was discarded, and the case was finally cured by the pressure of an elastic bag.

The number of cases of reduction of an inverted uterus by either one of the methods named has become so numerous of late years that an additional case excites no special attention. The oldest case of reduction is that of Tate, forty years; next come those of White, of Buffalo, twenty-two and fifteen years; Noeggerath, Dibardier, thirteen years; Abbie C. Tyler, eleven years; and numerous others up to within a few months of the occurrence of the accident.

Several cases of spontaneous reduction of the inversion are on record, the latest of which is that of Spiegelberg. There are nine others, those of Leroux, De la Barre, Baudelocque, Thatcher; three of Meigs; Rendu, Shaw. The mechanism of this process is explained only in Spiegelberg's case, as follows: The reduction took place during a profuse diarrhea, with straining; thereby the uterus was forced down into the pelvis, the round ligaments were put to their utmost tension, and the diarrhea continuing, the inverted fundus was drawn up, and gradually replaced by the traction of the round ligaments. This explanation certainly is plausible.

XII. PESSARIES.

By pessaries, we mean instruments of various constructions, shapes, and materials, designed for the purpose of supporting a displaced or distorted uterus after its replacement, or of gradually effecting that replacement. They have been employed in crude shapes for many years (the Arabians used a distended animal bladder; Paré, in 1573, made the first ring-shaped instrument); but only since the invention of the lever pessary by Dr. Hugh L. Hodge, of Philadelphia, can it be said that the construc-

tion and application of vaginal pessaries has rested on scientific and properly appreciated mechanical principles.

According to the construction and manner of use of pessaries, or uterine supporters, as they are also called, they are divided into four varieties: 1, abdominal; 2, vaginal; 3, vagino-abdominal; 4, intra-uterine.

1. Abdominal Supporters.

Abdominal bandages, corsets, supporters, are used either to sustain the relaxed, flabby, pendulous abdominal walls; or to support abdominal tumors or the pregnant uterus; or to compress the abdominal walls after removal of a large mass from the peritoneal cavity, as after labor, ovariotomy, tapping for ascites; or to lift up the fundus of an ante-displaced uterus.

According to the indication, a different form of supporter is required. If it is desired merely to support the abdominal walls by a uniform pressure exerted over the whole surface and directed chiefly upward, bandages

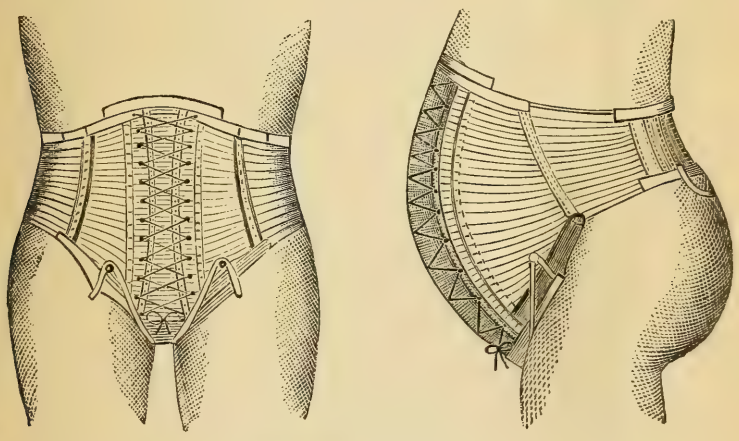


Fig. 177.—Pinard's Abdominal Supporter.

which enclose the whole abdomen are the most serviceable. They are either composed of silk, or elastic bandages sewed together, and closed by lacework behind, or of silk or jean with whalebone rods at intervals to ensure stiffness, and composed of several sections loosely united, the whole fastened by a strap or laces. Or the thoracic corset is made to extend down over the abdomen to the pubes, being stiffened by whalebones. Or the bandage shown in Fig. 177, and devised by Pinard, of Paris, to retain the fetus in its rectified position after external version, will be found serviceable in abdominal tumors. One of the objections to all these abdominal bandages is that they are liable to slip up and wrinkle, unless held down to the hips and pubes by bands passed between the thighs. These bands are either made of leather, or cloth, or, still better, of rubber-tubing attached before and behind by looped cords. Most patients object decidedly to the friction and pressure of these cords, and it always takes

several days for them to become used to them. If it is preferred, a broad single central band may be substituted for these two lateral bands. This is particularly useful if it is desired to exert a supporting influence over the vulva, as for the retention of prolapsus, or vaginal pessaries, or tampons, or hernia of the labium. The supporter of Noeggerath is a useful contrivance of this kind, the central pad being attached to two bands before and behind. The portion fitting over the vulva is generally occupied by a longitudinal pad covered with oiled silk or rubber cloth.

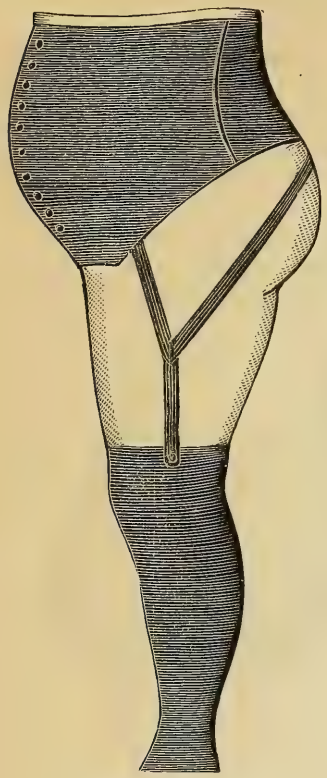


Fig. 178.—Home-made Abdominal Supporter.

The whalebone rods usually inserted in these supporters to render them stiff are liable to press into the flesh or rub against the crest of the ilium. They are therefore often unbearable, and give so much discomfort as to be discarded, and replaced by a soft bandage with thigh-straps. A woman can very often manufacture such a bandage for herself much better, and certainly very much cheaper, than she can buy it. Strong jean, canton flannel, or unbleached muslin, can easily be shaped, with a little ingenuity, into a bandage which will fit closely to the form, if supplied with two broad elastic bands at the top and bottom, which are long enough to go entirely around the body, and buckle in front. The lower strap should be fastened more tightly than the upper, in order to press the abdomen upward. A practical home-made supporter appears to be the one shown in Fig. 178, which is described by Dr. Julia H. Smith, of Chicago. The cut shows the bandage in position. "It is made of cotton drilling for winter, heavy linen for summer wear; one and one-fourth yard of drilling makes one of ordinary size. A measure is taken around the body just above the pubes, and at the waist. A seam is cut on the hips and in the middle of the back to make it fit the form, and the bandage is lapped in front, over a cushion made of hair, which is placed just above the pubes to make the necessary pressure. To prevent its slipping out of place elastic tapes are fastened on the bandage, and the end pinned to the stocking, thus serving a double purpose."

When it is desired to exert special pressure over the symphysis pubis in order to support or press back the fundus of an anteverted or anteflexed uterus, these uniformly compressing supporters are insufficient. An oval convex pad of cotton covered with cloth or kid leather may be attached to the inside of the bandage so as to fit immediately above the

pubis; or a special pad attached to an abdominal band, or a broad steel spring may be employed, the pressure being directed only on two spots, over the pubis and the lumbar vertebræ. This spring pad is constructed on the truss principle, and is illustrated by the bandage known as the *ceinture hypogastrique.*

A very good supporter for this purpose is the cedarwood pad of Thomas, which consists of an oblong piece of smooth cedarwood about six inches

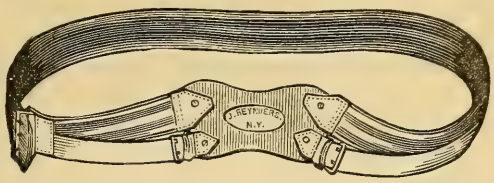


Fig. 179.—Thomas' Wooden Pad Supporter for Anteversion.

long, by three inches wide, by two inches thick, the abdominal surface of which is convex, so as to press deeply into the abdominal wall above the pubis. I generally employ the slightly concave hard-rubber plate of an abdomino-vaginal supporter as a supra-pubic pad, having the concavity filled out by leather padding, if necessary. I have found great benefit from these supra-pubic pads in aggravated anteversion, being even able to dispense with an intra-vaginal pessary while they were worn. Thus a few years ago, while on my vacation in the country, I was asked to see a city lady who was confined to her bed by an inability to retain her urine when up. I found an anteverted, hyperplastic uterus, which no doubt rested on the bladder when the patient was up. I sent her a cedarwood pad supporter as soon as I returned to the city, and with it she was at once able to leave her bed and walk about with almost entire comfort. On my return to the country two weeks later I added a Thomas cup-pessary (see Fig. 189), and thus gave her uterus all the necessary support. In another instance a young lady with sharp anteflexion was entirely relieved of her supra-pubic pain and bearing down feeling, and enabled to walk as well as in health, by means of the hard-rubber plate shown in Fig. 212. Of course this supra-pubic pressure did not remedy the version, which required a vaginal instrument. The abdominal pad merely supported the abdominal viscera, rendered the uterus less movable, and prevented its pressing on the bladder. Thigh-straps are always required to keep these pads in place. All the supporters and corsets which are designed to lift up and compress the whole abdominal wall should be sustained by broad bands passing over the shoulders and crossed in front and behind. Ordinary suspenders will answer for this purpose, or the abdominal supporter may be buttoned, hooked, or strapped to the thoracic corset, which it is fair to assume ninety-nine out of one hundred of all women still wear,

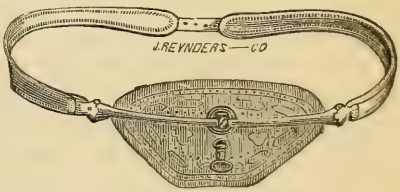


Fig. 180.—Ceinture Hypogastrique.

in spite of medical protest. If the corset is provided with a circular metal border resting on the hips, so that downward pressure on the yielding abdominal wall is avoided, it can do no harm, and any weight attached to it (such as an abdominal supporter, and chiefly the skirts) will hang from the shoulders.

The ordinary **T**-bandage is useful in the same cases as Noeggerath's apparatus, above described, and is chiefly employed to apply a napkin to the vulva during menstruation or a vaginal leucorrhea, or to prevent medicinal agents from soiling the clothes, or tampons or pessaries from escaping. Every woman can make one for herself of cotton or linen covered with oiled silk. The genital piece is attached to the waistband in front and behind, or the bandage may be in one piece.

The manner of enveloping the abdomen with broad binders, as after labor and laparotomy, does not properly belong to this work.

2. Vaginal Supporters.

Pessaries which are contained entirely within the vagina are so variable in construction, in accordance with the peculiar features and necessities of each case and the practice, ideas, and hobbies of the physician, that their number is legion, and it will be absolutely impossible for me to enumerate and describe them all. Besides, it would be entirely unnecessary to do so, since the vast majority are either mere trifling modifications of some main type, to each of which the ambitious inventor or the obliging instrument maker has given the former's name, or they are mere freaks of fancy—theoretical experiments—which have never extended beyond the inventor's practice or the instrument maker's shop. I shall endeavor to describe all the varieties of pessaries for each displacement of the uterus which have become deservedly or undeservedly popular, explain their advantages and disadvantages, their uses and abuses, so far as my experience has enabled me to judge; and shall refer the reader for the study of the obsolete and useless instruments of this class to the instrument makers' catalogues and the museums of our medical colleges. In no branch of mechanical art does the inventive spirit of mankind seem to have run more riot than in the production of pessaries, with the only exception, perhaps, of the obstetric forceps.

Pessaries are most frequently made of hard rubber, polished to such a degree of smoothness as not to irritate the vaginal walls; but they may be made of silver or aluminium (the lightness of the latter being an advantage), or of celluloid; or, if a flexible instrument is desired, we have them of flexible tin, of thick copper wire covered with soft rubber, of a large watch-spring also covered with soft rubber; or of fine strands of wire laid together so as to put the end of each strand in a different place, also with soft rubber covering. Finally, for large flabby vaginæ in prolapsus we have inflatable bags of soft rubber, glass balls and rings, canvas rings covered with japan, wooden rings, etc.

The great objection to all pessaries made of inflexible material is that

the shape of the instrument cannot be changed to suit the peculiarities of each case, and that, therefore, a large assortment of different sizes and shapes must be kept on hand to choose from. In a city with instrument makers at hand this is a matter of little consequence, but in the country it is a serious evil which may entirely prevent the physician from relieving the class of patients for whom pessaries are needed. And even in cities, the inconvenience of having to make a new appointment with your patient until you are able to procure a better fitting pessary for her, instead of being able to shape the instrument at once to fit her case, is a matter of annoyance to both parties. The hard-rubber pessary, to be sure, that is to say, the variety made of a slender ring, can be bent and moulded by being covered with sweet oil and carefully heated over a spirit-lamp, or in boiling water. But, over the lamp the inexperienced operator will probably blister the pessary and spoil it (for a pessary with a rough surface is absolutely useless and injurious); and in hot water the pessary is seldom sufficiently heated to retain its flexibility until removed and bent to the desired shape. It certainly requires a greater amount of practice and dexterity to mould these hard-rubber pessaries than the majority of practitioners possess. I have found that by keeping the pessary at the spot where it is being heated *constantly* covered with sweet-oil, which can be contained in the palm of the other hand, or in a vessel close by, and by moving the pessary continually over the flame, as a rule, blistering can be avoided. A good plan is to wait until the pessary is so soft as to bend or straighten by its own weight, and then press it on a marble slab to the desired curve and pour cold water over it or hold it a few minutes until it is set.

To furnish us with a pessary flexible at will, copper wire covered with soft rubber was introduced, but all soft-rubber pessaries possess the great, irremediable objection of absorbing the vaginal secretions, soon becoming offensive, and of irritating the tissues by a gradually increasing roughness of surface. Soft rubber cannot, it seems, be so treated by chemicals as to be flexible, and at the same time remain unaffected by the acid vaginal secretions. So far, therefore, we must of necessity rest satisfied with inflexible, if indestructible, hard-rubber, and flexible, but destructible, soft-rubber coated wire pessaries, since all experiments to furnish reliable and durable malleable substitutes have failed. Copper wire has been covered with rubber prepared in a peculiar manner, so as to preserve a smooth and incorrodable surface, but it was soon found to crack and chip; and the celluloid covering, which a few years ago was thought to have solved the problem, soon proved open to the same objection.

The flexible rings of block tin and copper, uncovered by rubber, are too easily roughened by deposits of vaginal salts on them to be of more than temporary utility as models after which hard instruments are to be constructed. Not only those pessaries which require to be modelled to suit each case, but also those which act chiefly by their bulk, should be of unchangeable material. The large rings for prolapsus uteri should, therefore, be of glass or hard rubber, in preference to canvas and soft rubber.

The *general indications* for vaginal pessaries are of course some form of uterine displacement or distortion (anteversion or anteflexion, retroversion or retroflexion, latero-flexion, prolapsus) or a prolapsus of the anterior wall of the vagina together with the posterior wall of the bladder (cystocele), or of the posterior wall of the vagina with the anterior wall of the rectum (rectocele). Finally, excessive mobility of the uterus, resulting in alternating painful pressure by the fundus on the bladder or rectum, may require a pessary merely as a means of maintaining the uterus in one position.

It is not to be understood, however, that every displacement or distortion requires a vaginal supporter; it may be so slight as to produce no symptoms whatever, or it may not distress the patient even though severe. Thus the uterus may be moderately anteverted or anteflexed, but the patient suffer neither from pressure on the bladder, nor dysmenorrhea, nor be sterile (the usual results of the higher degrees of these displacements). Or the uterus may be retroverted only in the first degree, and the patient experience no annoyance from it, or there may be a more severe backward displacement and still no symptoms. In these cases it may not be necessary to introduce a pessary, especially if the patient is advanced in years, unmarried, or beyond the child-bearing period; and the probabilities are that the usual atrophy of the uterus after the menopause will render future annoyance from the displacement still less likely. Again, the replacement of a retroverted uterus and its support by a pessary may give the patient more pain than if the case is let alone; or repeated attempts show that the uterus is too flabby to admit the pressure of a pessary, or the vagina is too short, or the posterior cul-de-sac too tender to bear the pressure always exerted by a pessary.

In young girls, for instance, a moderate anteflexion or retroversion does not necessarily call for a vaginal supporter unless the symptoms actually require local interference. In ante-displacements an abdominal pad will often suffice. It does not follow that, because a young girl has a displacement of moderate degree she will thereby necessarily be unfitted for marriage and maternity. Still, I have generally followed the rule, that if a displacement of anything more than the first degree is discovered in a young woman who expects to be married soon, and who consults a physician for one of the local signs of uterine disease (backache, bearing down, dysmenorrhea), that displacement should be rectified as much as possible before she should be allowed to marry. Treatment is much easier and more effectual then than later, when the excitements and requirements of married life fully occupy the sexual organs. No man likes to have his wife suffer from uterine disease and be subjected to local treatment, by pessaries or otherwise, almost before the honeymoon is over. And his feelings are not always free from selfishness, for his own comfort is disturbed thereby. Besides, a displacement is always more or less aggravated by the mechanical and vascular irritation of the sexual organs. Therefore it is always best to endeavor to cure uterine disease, rectify a displacement, before marriage, even though the discomfort therefrom be but slight at the

time. The chances are that marriage will arouse symptoms which have not yet appeared.

Further, many patients present themselves with displacements, chiefly backward, in whom a pessary is inadmissible, because the displacement cannot be rectified; the uterus being held down by adhesions remaining from an attack of peritonitis or cellulitis. Before a pessary can be worn with benefit and comfort, these adhesions must be dispersed or stretched, and months are usually required to do this, if indeed it be possible at all. In some cases, however, this very stretching may be accomplished by the pessary itself; but such cases are the exception, and must be carefully watched lest the pressure rekindle the inflammation or produce ulceration.

In displacement of the vaginal walls—cystocele and rectocele—the amount of displacement and the discomfort experienced therefrom, will influence the necessity and choice of a pessary. If there be a loss of support for the posterior wall (whereby the anterior wall may also become displaced) through destruction of the perineum, the restoration of that part by a plastic operation is called for before a properly fitting supporter can be used with benefit. To follow the old time- (but not otherwise) honored practice of holding up the prolapsed parts by crowding a large globular or annular supporter into the vagina, which acts only by its size, is not treating the case scientifically.

In prolapsus uteri et vaginæ, when the whole mass protrudes from the vulva, a supporter is called for in the highest degree. But the difficulty is not to form an indication for a supporter in these cases, but to find the instrument which will keep up the uterus and produce neither pain nor ulceration by pressure.

Sterility due to a displacement (ante- or retro-) calls for a reposition of the organ and its retention by a pessary. When conception has taken place, the retention of the pessary is still important, because if it were removed, the uterus might, and in consequence of its increased weight probably would, again become displaced, and the thereby induced congestion might readily bring on a miscarriage. For the same reason, if a uterus enlarged by early pregnancy is found displaced it should be restored to its normal position and retained by a pessary. This rule applies chiefly to retro-displacement. In ante-displacement the growth of the organ during pregnancy usually accomplishes the rectification by itself. Impregnation of a retro-displaced uterus is therefore a direct indication for a pessary, which should be worn until the growth of the organ has brought the fundus above the promontory of the sacrum, that is, till about the beginning of the fourth month.

Occasionally the vomiting of pregnancy is arrested by the replacement of a dislocated uterus, and its retention by a pessary. A vaginal examination is therefore always advisable when the vomiting is more than usually severe or intractable.

Counter-indications to the use of pessaries are of course the absence of a properly formulated indication, such as already described; further acute inflammation of the uterus and adnexa, and of the vagina, and chronic in-

flammation of these parts when the pressure of the finger gives pain or the displacement is due to adhesions which prevent the reposition of the uterus. A profuse leucorrheal discharge may also counter-indicate a pessary for the time being, because the unavoidable irritation of every pessary produces a vaginal discharge and of course will aggravate one already existing. A cervical or intra-uterine discharge does not do so, because the chronic congestion upon which the discharge depends may be due to the displacement and will be relieved by the reposition and retention of the uterus in its normal position.

A laceration of the cervix may counter-indicate a pessary, because the fixation of the vaginal walls by the pessary tends to separate the everted lips. The question which of the two affections, the displacement or the laceration, gives the most trouble will then have to be decided; generally the displacement will carry the day.

Married life does not counter-indicate the wearing of a pessary, unless the husband absolutely objects to any foreign body in the vagina of his wife. The slender, smooth, and accurately fitted pessaries now generally used do not, as a rule, interfere with coition, if the wife be informed by her physician how to adjust the pessary for the moment in case it should chance to be in the way. This advice will consist chiefly in showing the wife how to keep the anterior curve of a lever pessary pressed against the symphysis pubis with the finger at the moment of intromission, and in directing the husband to be particularly gentle and avoid deep insertion. Frequently it is advisable not to inform the husband of the presence of a pessary, to which he might object and which he does not discover. But recently a patient wearing a Gehrung pessary for cystocele told me that her husband had not yet become aware of the fact that she was wearing such an instrument, although coition had been performed many times since its introduction. Violent coition may naturally give pain under such circumstances or displace the pessary.

The rule is to remove, as far as possible, all counter-indications before applying a pessary, and this preparatory treatment may occupy months.

General Considerations influencing the Selection, Application, and Management of Pessaries.

There is probably no therapeutic measure in gynecological practice which is so little understood and so thoroughly mismanaged as the use of pessaries. On the ignorance of the practitioner will, in the large majority of cases, depend his want of success in fitting a pessary so that it will retain the uterus in its proper position; and of course the fault is never sought in himself, but is always attributed to the pessary. A very common error is to choose too large, too sharply bent instruments, which do too much and crowd the uterus into another position quite as distressing as the original displacement. Next to the proper selection and fitting of an instrument to each particular case, the omission to watch it and prevent its doing injury by pressure or becoming displaced, and the too long

retention of the same instrument without a change or occasional removal, are the causes of the disappointment and unpleasant effects experienced by many practitioners.

Properly selected, adjusted, and watched, vaginal pessaries are not only most useful, but actually indispensable instruments in the treatment of uterine displacements. It is their abuse, not their use which has brought them into discredit with some physicians.

Mode of action.—Vaginal pessaries act in three ways: 1, by their size (balls and thick rings of firm material in prolapsus); 2, by the direct support which they give to the uterus or vagina (whether replaced or not), without themselves attempting to restore the normal condition (in anteversion and anteflexion, cystocele, rectocele); and 3, by a peculiar lever action which tends to replace the displaced, then always retroverted fundus uteri (all the ring pessaries constructed after the principle of Hodge's closed lever pessary).

1. *Pessaries which act by their size* cannot be considered curative, since they necessarily distend the vaginal walls to their utmost limit in order to insure their retention, and therefore weaken and prevent them from contracting and regaining their tone. These pessaries are but makeshifts, and are allowable only where no other curative mechanical appliance or an operation is practicable. In women long past the menopause, with flabby vaginæ, small uteri, relaxed and atrophic ligaments and tissues, whose sexual organs have passed the period of functional activity and usefulness, it is permissible to lessen the chances of a permanent cure by increasing the very condition which produced the displacement, viz., the relaxation of that great uterine support, the vagina. In these cases, and they are all instances of more or less complete prolapse of uterus and vagina, we expect no cure, we know none is possible with or without operation, and we merely wish to make the patient as comfortable as possible for the remaining minority of her life, by keeping the prolapsed organ within the body.

In young, sexually still vigorous women, with tissues which yet admit of restoration to tone and health, it seems to me unjustifiable to injure them permanently and destroy their hopes of permanent cure, by stretching their vaginæ to the utmost with large disks or globes, or by elastic flexible rings which are retained only through their constant centrifugal expansion. We should restore the parts to their normal condition as nearly as possible by astringents, by supports which contract while they support, and if need be by operation, and then, if still necessary, introduce a properly fitting pessary, which, if it does not cure, does not at all events preclude the hope of improvement.

The cases to which these remarks apply are solely cases of prolapsus of the uterus and vagina, and of rectocele and cystocele.

2. *Pessaries which act only by the direct support* they give to the displaced part will be described in the sections on Anterior and Lateral Displacements, and Displacements of the Vaginal Wall. These pessaries, in order to afford this support, must of course have a base upon which to

rest. This base is generally offered by the contractile walls of the vagina, or by the perineum or floor of the pelvis, or the symphysis pubis. They act merely as splints to the displaced part, preventing it from becoming still more displaced, and thus, it is true, in an indirect manner, give the attachments of the dislocated organ an opportunity to recover their tone and vigor. It is in this manner that all anteversion and anteflexion pessaries prove beneficial and (perhaps) ultimately curative. As compared with the pessaries next to be described, the pessaries for ante-displacements occupy a somewhat insignificant position, and could be more easily dispensed with than even those which act merely by their size. Anteversion of the uterus is only occasionally of sufficient severity to give rise to serious inconvenience. Emmet even asserts that it is not the anteversion which causes the distressing supra-pubic weight and dragging, but the simultaneous downward displacement of the uterus, and that all anteversion pessaries act by lifting the whole uterus up, not merely by supporting the fundus. To a certain extent I believe he is right, but I certainly have seen pessaries which merely kept the fundus away from the bladder, without materially lifting up the whole uterus (such as Gehrung's, Fig. 182, and Thomas' open cup pessary, Fig. 189), give great relief. In anteflexion the same may be asserted, since no severe anteflexion was probably ever cured, no uterus entirely straightened, by an anteflexion pessary. The flexion may be slightly diminished by the support which the fundus gets from the upper rim of the pessary, and perhaps by the slight backward extension of the cervix, but on removal of the instrument the angle at once returns. Dysmenorrhea will, however, be relieved, and sterility may be cured by this slight diminution of the angle of flexion.

Vaginal prolapse can be cured in time by these pessaries, provided the necessary support of the perineum is not entirely lost or is restored by operation. Recently a most excellent instrument has been devised by Gehrung, the largest size of which accomplishes, in many cases, what no other intra-vaginal pessary has done before, except through its size, viz., to retain a prolapsed uterus simply by supporting the also prolapsed anterior wall of the vagina.

3. The *pessaries which act by a peculiar lever action*, and by that action strive to restore the displaced uterus to its normal position, are by far the most numerous, the most frequently needed, the most beneficial, and the most indispensable. They are used exclusively for retro-displacements, either version or flexion. They are all oblong rings constructed on the single or double lever principle first introduced into the doctrine of pessaries by the late Dr. Hugh L. Hodge, of Philadelphia, some twenty-five years ago. Since then numerous modifications of his original instrument have been made, but the lever principle has been preserved in all of them. The shape of the Hodge pessary is shown in Fig. 192. One curved end (the shorter) goes behind the cervix, the other (longer) in front against the anterior vaginal wall. The patient now being erect, the weight of the bladder and intestines, aided by the increased normal intra-abdominal pressure during inspiration and walking, presses the anterior bow of the pessary

downward, and naturally tilts the posterior end up, and with it the retro-displaced fundus uteri. Therefore, in the very position in which the patient needs the replacement and support most, in the erect, the force necessary to produce this admirable lever action is supplied by natural means.

If the uterus is *not entirely replaced* before applying the pessary when the patient stands, the backward and downward pressure of the still somewhat retro-displaced fundus, with the weight of the superincumbent viscera, will rest on the posterior arm of the lever and thus tilt up the longer anterior arm against the neck of the bladder. The pressure there may be so severe as to be unbearable. The importance of entirely replacing the uterus before applying a pessary is therefore apparent. When the woman lies down the weight of the viscera relieves the fundus and the posterior

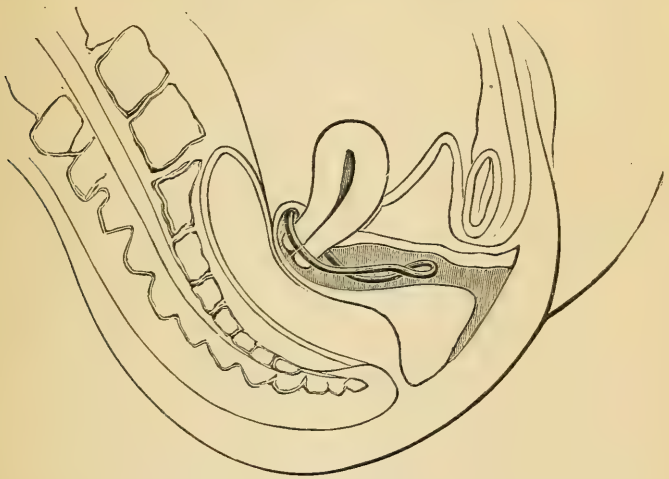


FIG. 181.—Emmet's Retroversion Lever Pessary Supporting Uterus (Emmet).

arm of the pessary, and the anterior arm becomes loose. This constant rocking motion, which is exerted by every well-fitting lever pessary, whether the uterus is entirely replaced or not, slightly changes the position of the instrument each time, and thus avoids too steady pressure on one spot. But the position of the uterus is not materially changed during the rocking of the pessary, for the latter will always regain its position behind the cervix as soon as the backward pressure by the uterus is relieved in the horizontal position.

When the *uterus has been entirely replaced*, as it should be before the pessary is fitted, this action, in my opinion, is reversed, and the pressure in standing is exerted on the anterior arm, and in lying down on the posterior. The latter, however, will be minimal if the uterus remains replaced; only the slight backward tendency of the fundus produced by the dorsal position will be observed.

In accordance with this difference of leverage, as the fundus is replaced

anteriorly or not, a lever pessary will but very rarely succeed in replacing a retro-dislocated uterus. Its constant pressure may elongate the posterior vaginal wall, but only by accidental changes of position will the uterus be anteverted while the pessary is worn. If, however, the anterior bar of the pessary derives its support from the immovable pubic bones, then its steady pressure may finally lift up the fundus. Such pessaries will be described further on, and are often very useful.

In many pessaries the anterior arm of the lever is elongated in order to conform more to the shape of the vagina and prevent the pessary from turning in the vagina. The principle, however, always remains the same; the pressure on the anterior arm is merely distributed over a somewhat larger area. The amount of leverage depends entirely upon the curve of the pessary. Pessarie with sharp curve of the posterior bow (that which is to go behind the cervix) will exert a more powerful lever action on the retro-cervical tissue than those with but a moderate curve.

The sharper the curve the higher will the uterus be lifted, and the more will its ligaments be stretched; this hyper-tension may be so extreme as to give rise to as much discomfort as the original displacement. It is therefore all-important to properly estimate the amount of leverage required and permitted by the degree of displacement, the depth of the posterior vaginal pouch, and the weight of the uterus, in choosing a pessary for a particular case. If too great a leverage is exerted, the uterus may be anteverted; or what is even more likely, the sharp curve of the posterior bow will cause the pessary to press so firmly into the posterior wall of the uterus at the vaginal junction, as to bend the organ backward over the pessary, and thus substitute a retroflexion for a retroversion. The curve of the anterior, or pubic extremity should correspond in degree to the posterior or uterine arm, that is, the greater the latter, the greater also the former.

The line of support of these lever pessaries is not to be sought at any one spot, neither at the symphysis pubis, nor the posterior vaginal wall, nor the retro-cervical pouch; but wherever the pessary touches the vaginal surface it has a certain amount of cohesion, and if properly fitted, and the vaginal walls have their normal contractility, the pessary is grasped by them and securely held. It moves as they move, and needs no fixed fulcrum upon which to hinge. Still, in order to have a lever action, it must have a resting point somewhere, and this point, in my opinion, is that portion of the vagina extending from slightly below the level of the cervix to the apex of the posterior vaginal pouch. In this posterior pouch the posterior curved bow of the pessary rests, and if the uterus is properly replaced, is caught there, as it were, by suction. Whatever fulcrum the pessary has is at about the level of the external os on the posterior vaginal wall. If this posterior wall is relaxed, or the support of the perineum lost, the ᴗ like curve of the wall is destroyed, and this resting-place for the pessary is wanting; the instrument, therefore, is not retained, glides down, or must be so large or so broad in front as to act by its size. Its size and shape then retain it, and the pubic bones serve as a fulcrum for

the lever action. But it should be understood that in a normal vagina, with proper posterior wall, the pessary has no fixed point as a fulcrum, least of all the symphysis pubis. This is precisely the advantage of the lever pessary, and the reason why it is more easily borne than any other variety. The only point where prolonged pressure of even a small retroversion pessary occasionally produces excoriation is in the posterior cul-de-sac, on the posterior aspect of the cervix. A well-fitting pessary should never reach to, and certainly not below, the pubic arch. Those pessaries which fit best and can be worn the longest without removal or injury, are such as are grasped in the posterior vaginal pouch by the suction spoken of, and the anterior curve of which hangs almost free in the vagina, merely touching the anterior wall.

In some cases a lever action is not desired, and still a lever pessary is used. Such are cases with flabby relaxed vagina, heavy, deep-seated uterus, gaping, flabby vaginal orifice; and the pessary is used as a mere support by its size and shape. A broad, but slightly curved Hodge is then used, which is retained through its broad anterior bar pressing against the pubic bones. An indentation in the transverse anterior bar, saves the sensitive urethra from pressure. This form of pessary is also useful in excessively movable uterus.

Certain gynecologists do not believe in this "lever-action" of the lever pessary and claim that it elevates the retro-displaced fundus uteri by stretching the posterior vaginal pouch backward, thus dragging the cervix also backward and thereby throwing the fundus forward. I do not doubt that this traction force exerts some influence, chiefly in dislodging the fundus from the sacral excavation (if the uterus has not been replaced) or in tilting the fundus still more forward (if the organ has been anteverted). But I have found the very pessaries which held up the uterus best and served gradually to restore the organ to its normal position, to be those which did not stretch the posterior vaginal vault backward, and in which the increase of curve brought the lever principle fully into play. By examining a patient wearing a lever pessary first lying on her back and then standing, the difference of leverage on the retro-cervical tissues can be at once appreciated.

How to Adjust Pessaries.—A cardinal rule in the employment of pessaries is, to *fit every pessary to every case.* There are as many different shapes and sizes of vagina as there are of hands and feet, and every woman has her own peculiar vagina as she has her face. While, therefore, many pessaries may fit many vaginæ, exactly as one size of gloves or shoes may fit many different people, this is only because, among many vaginæ, there may possibly be a certain number alike. Only by careful examination and measurement can the dimensions of the vagina be ascertained, and in accordance with the result obtained, the proper variety, shape, and size is selected. Emmet relates that among five or six hundred old pessaries in his office, which had been in as many vaginæ, there were not to be found two exactly alike. To a man with Emmet's own peculiar mechanical ingenuity and dexterity, and holding his views on the dependence of uterine

displacements on contractions of the ligaments and para-uterine cellular tissue, this enormous variety of vaginal pessaries undoubtedly appears indispensable. Fortunately for the general practitioner and the man without special mechanical ingenuity, it is not always necessary to have the pessary fit every fold and curve of the vagina with absolute accuracy. Many patients can be benefited and cured by using the pessaries which are kept wholesale in the shops, and which are made in certain fixed sizes and shapes. But one thing is certain, and that is that no man without at least a certain amount of mechanical knack, can hope to benefit his patients with pessaries. In the old times when the object of all pessaries was merely to lift up or sustain the uterus without regard to the variety of displacement, and with no curative object in view, of course anybody could adopt one of the crude pessaries then in use. But the scientific and rational employment of our present vaginal supporters requires not only a thorough knowledge of the normal sexual organs and their surroundings, and an intimate acquaintance with the pathological condition in each particular case, but also a certain amount of mechanical ingenuity and manual dexterity. Without these requirements, the operator is more likely to do his patients harm than good, and will probably disappoint them, as much as he will himself be mortified at the failure of his efforts. But, probably he will console himself by blaming the pessary!

This dexterity in modelling and shaping pessaries can really never be thoroughly acquired, unless an inherent mechanical skill is present. The practitioner need not therefore be ashamed of his want of success, for not every one of us can be an Emmet or a Thomas. And a clear understanding of the nature of the case and of the treatment required will enable the majority of physicians to benefit their patients with displacements very materially.

To secure a perfectly fitting pessary, Emmet models one of soft block-tin for every case, lets the patient wear it until he has satisfied himself that it suits her, and then has it reproduced in hard rubber or aluminium. In this way a perfect fit must be obtained, provided the original model was correct. Many physicians, who find none of their supply of pessaries to fit a certain case, use the pessaries of copper wire covered with soft rubber, moulding them to the desired shape ; and I confess my preference for these to those of tin, because the latter are too thin and liable to bend or cut into the tissues. These soft-rubber pessaries can be worn for several weeks or longer with proper regard to cleanliness, therefore quite long enough to judge whether the shape is a good one and should be fixed in hard rubber.

As yet, hard rubber is universally employed for vaginal pessaries, and certainly is, by its durability, high polish, neatness and cheapness, the best material. Only when it becomes necessary to change the shape of the pessary, is the need of a flexible material felt which shall possess the durability and the other good qualities of the hard rubber. As already stated, the material to supply that want is still undiscovered.

In estimating the variety, size, and shape of a pessary, the physician

should ascertain: 1, the nature and degree of the displacement; 2, the mobility of the uterus; 3, the length and width of the vaginal canal; 4, the dilatability and contractility of its walls; 5, the depth and width of the posterior vaginal pouch when the uterus is replaced (this applies particularly to retro-displacements); 6, the weight, size, and density of the uterus; 7, the dimensions and length of the intra-vaginal portion of the cervix; 8, the presence or absence, and the seat of any tenderness in the parametrium or uterus; 9, the degree of laceration of the perineum, or of support afforded by that body if not torn; 10, the amount of vaginal secretion; 11, the tension of the anterior vaginal wall with the bladder; 12, the presence of a prolapsed ovary at the bottom of Douglas' pouch.

The *nature and degree of the displacement* is, of course, the first thing to be ascertained. That unknown or uncertain, the selection of a supporter is impossible. The diagnosis is made either by finger and bimanual method, or by the sound, as already described. The degree of displacement is marked in the same manner, and from it and the symptoms the necessity and variety of the pessary determined. This is usually a simple enough matter. But the particular shape, size, and curve of the instrument is by no means so easy, and to decide upon these points the other factors enumerated should be inquired into.

The *mobility of the uterus* is certainly, next to the nature of the displacement, the most important point in this whole question, especially as regards prognosis; for what good does it do us to know how the uterus is displaced, if it is fixed and immovable by cellulitic and peritonitic adhesions and cannot be replaced? As no pessary should be introduced without the uterus having previously been replaced, the effort to accomplish this should be made after one of the methods described in the respective chapter. If it fails, the idea of placing a pessary should be abandoned, unless in the occasional instances where the adhesions are so old and elastic that an effort may be made to stretch them by the steady upward leverage of the posterior end of the pessary (this also applies only to retro-displacements). If the attempt succeeds, the pessary should not be applied until perfect replacement has been obtained. The depth of the posterior vaginal pouch is vastly greater when the uterus is anteverted than when the retro-displaced fundus presses it down.

The *length and width of the vaginal canal* will determine the breadth and length of the pessary.

The vaginal orifice may be quite large and still the vagina narrow with healthy, contractile walls; or, on the other hand, the orifice may be narrow and the vaginal pouch roomy and spherical. In the latter case a larger pessary may be needed than can easily be passed through the vaginal orifice, and strong retraction of the perineum is required to admit it.

The length of the vagina is ascertained, in the erect position, by the finger or by passing the straight whalebone stick or the sound up behind the cervix to the limit of the pouch, and marking the spot where it touches the symphysis pubis. Beyond this point no vaginal pessary should descend. The width of the vagina is, of course, easily ascertained by the finger.

The *dilatability and contractility of the vaginal walls* is an important point, because the rule for all pessaries acting by leverage, indeed, all which do not act only by their size, is that they shall not dilate the vagina sufficiently to produce tension, or to cause the pessary to press into the tissues. A very dilatable vagina with lax walls will, therefore, require and permit a larger pessary than a canal with normally contractile power, such as the healthy vagina possesses. It seldom happens that a pessary, which is to act on the lever principle alone, need be larger than three inches long and one and a half inch wide.

The *depth and width of the posterior vaginal pouch after replacement of the uterus* determines, to a great extent, the amount of the curve of the posterior portion of the pessary (retroversion only, again) and the probability that the pessary will be retained. The deeper the retro-cervical pouch, the easier to find a suitable instrument. The shallower the posterior pouch, the more difficult to find a pessary which will retain its proper position, and do its duty by pressing the pouch upward and the body of the uterus forward. In many cases the posterior vaginal pouch requires elongating by mechanical pressure from pessaries until it has been pushed so far up as to give the vaginal pessary a purchase on the body of the uterus. This may be done either by changing the length and curve of the vaginal pessary from time to time, and thus gradually stretching the pouch up to a level with the internal os behind, or by supporters connected with an abdominal bandage. It may require months to obtain this result. In congenital retroversion of an anteflexed uterus, or congenital shortness of the vagina and intravaginal portion of the cervix (conditions which are often found in married but sterile women, and which Emmet believes to be due to unappreciable inflammatory contraction of one or both broad ligaments), this deformity of the posterior pouch is very marked and exceedingly difficult to change, requiring, at times, the aid of an intra-uterine stem as a handle by which to raise up the uterus with a lever-pessary.

In no case should the uterine arch of the pessary be so sharply curved as to press directly against the cervix at its junction with the vagina. The uterine curve should be straight upward, not forward also, and the pressure be exerted against the apex of the posterior vaginal pouch. The uterus should rest against the posterior curve of the pessary as a person rests against the back of a chair, and any pressure exerted on the uterus should proceed from the whole uterine curve, not from the posterior transverse bar only.

The *weight, size, and density of the uterus* also influence the selection of the pessary. The heavier the uterus, the larger the pessary (within proper limit), and the thicker its branches in order to avoid cutting into the tissues. Besides, in retro-displacements the posterior bar of the pessary may need to be enlarged by addition of a bulbous expansion (see Fig. 198) in order to avoid the erosion and cutting of the pessary into the posterior wall of the heavy uterus. The same form of pessary may also be required in cases where the normal density and firmness of the uterine tissue has

become so much impaired as to allow the uterus to gradually bend over the posterior bar of the slender pessary, as though there were a joint at that spot. This latter accident is a source of great annoyance to patient and physician, and may tax the ingenuity of the latter greatly before a proper supporter is found. The best way probably is, if the bulb fails, to construct a pessary shaped like the capital letter U, in the centre of which the uterus rides as in a saddle. The posterior bow reaches up so high that the point of flexion is below the cross-bar. The difficulty of introducing these pessaries is the objection to them ; it may often be overcome by inserting them through a Sims speculum.

I think I have had more trouble in fitting pessaries to retroflexed uteri with this peculiar joint-like flabbiness at the point of flexion, especially if the cervix also was short and the posterior vaginal pouch shallow, than in any and all other forms of uteric displacement. Here the Cutter pessary (Fig. 209), or an intra-uterine stem with a lever-pessary, have at times answered the purpose ; but I confess to having been completely baffled by several of these obstinate cases, and have therefore availed myself of several favorable opportunities for testing Alexander's method of opening the inguinal canal and shortening the round ligaments. My experience with this operation is so far confined to four cases, and I am as yet unable to make a positive report on its value.

The *dimensions and length of the intravaginal portion of the cervix* should be noted, because a large cervix requires a correspondingly large pessary, and the length of the intravaginal portion determines the depth of the vaginal pouch.

The *presence or absence, and the seat of tenderness in the parametrium or uterus* are exceedingly important points in deciding upon the advisability of introducing a pessary at all, and upon the variety, shape, and size. If there is any evidence of acute inflammation of uterus or adnexa, the pessary is counter-indicated. If there be a tumor in the pelvis due to chronic cellulitis or peritonitis, a pessary should not be used, because it is of no service, the uterus being fixed, and needing no support. But if mere localized tenderness is felt in the vaginal pouch, without any appreciable swelling, the question may arise whether this is due to subacute inflammation or to the pressure of the displaced uterus ; if the former, the pessary will do harm, if the latter (and replacement of the uterus may decide the question) of course the pessary should be applied. If the tenderness be very slight, the pessary may be so chosen or changed as to avoid pressing on this spot ; this is frequently done with retro-uterine tenderness, the exact nature of which is not clear. If the uterus is tender to the touch, as it very often is in displacements (ante- and retro-), the question comes up whether this tenderness is not due to the congestion produced by the displacement. This is very frequently the case, and the reposition and retention of the uterus by a pessary is therefore called for. The tenderness will then soon disappear. Often, however, the tenderness is so great (chiefly in retro-displacements) that preparatory treatment is required before the pressure of the pessary can be borne.

The *degree of laceration of the perineum, or of support afforded by that body, if not torn,* is important in selecting a pessary; for a larger instrument is required if the normal support of the perineum is wanting, or the vaginal orifice gapes. It is not because the pessary rests upon the perineum, but because the natural ∪ curve, to which the lever pessary conforms, is wanting when the perineum is destroyed or relaxed. It frequently becomes necessary to restore that body before a pessary of a size corresponding to the undilated vaginal canal can be retained. A larger instrument, which would be retained, exerts too great a tension on the vaginal walls, and will soon give pain and produce ulceration. If an operation is impracticable, the uterus may require to be supported by a pessary which acts through its size or by expansion, and that this is injurious has already been pointed out.

The *amount of vaginal secretion* will influence the actual placing of a pessary, rather more than its shape or size. If there is a profuse vaginal leucorrhea, particularly if the discharge is discolored and is seen through the speculum to proceed from a maceration or abrasion of the vaginal epithelium, a pessary should certainly not be applied. The cause of the discharge must be removed, in the manner described under Applications to the Vagina, before it would be wise to subject the mucous membrane to the inevitable irritation of a pessary. Besides, a profuse chronic leucorrhea is a probable indication of a relaxed flabby vagina, or of a uterine catarrh.

The *tension of the anterior vaginal wall with the bladder* will affect the selection of a pessary, since if that part is relaxed or prolapsed (cystocele), a peculiar form of pessary is required, which will not only support the uterus, but also the anterior vaginal wall. Should the position of the uterus be normal, the cystocele alone requires to be supported, and for this purpose a special variety of pessaries is employed.

The *presence of a prolapsed ovary at the bottom of Douglas' pouch,* will often greatly interfere with the wearing of a pessary. Momentary pressure on the ovary with the finger gives acute pain if the organ is congested or inflamed; but even the normal prolapsed ovary will soon resent the steady pressure of a pessary and call for its removal. The constant, dull, aching pain in the back and hips will then depend on this pressure. I recently saw a case where the ovary was latero-prolapsed and lay to the left of the cervix; it appeared to be fixed by adhesions. As the patient had an acute retroflexion, I deemed a lever pessary necessary and introduced one after replacing the uterus. The pessary did very well so far as the uterus was concerned, but still the patient complained of a dull ache in the left hip, which soon became unbearable. The cause was found in the steady pressure exerted by the pessary on the prolapsed and adherent ovary, a pressure which had not been exercised when the pessary was first introduced. The gradual adaptation of the parts to the pessary had brought it in contact with the ovary. As the latter could not be replaced, and I could contrive no pessary which would avoid the ovary and at the same time support the retroflexed uterus (which, by the way, was not easy) I was, after several ineffectual trials, forced to let the patient do

without any pessary. She preferred to keep her retroflexion, which gave her far less discomfort than the pressure of the pessary on the ovary. Perhaps a greater amount of mechanical ingenuity might have led to the construction of a suitable instrument, and here again it is the special ingenuity of the physician which enables him to conquer difficulties, unsurmountable by others less dexterous. Peculiar shapes must be given to the pessaries so as to avoid pressing on the ovary and still support the uterus. Or the posterior crossbar of a retroversion pessary is made very broad or very thick, so as to put the pouch to the stretch and fill it out, and thus prevent the ovaries from descending. Or the central portion of the crossbar is bevelled out so as to remove pressure from an ovary situated at the bottom of Douglas' pouch.

In many cases the vagina will gradually adapt itself to the size and shape of the pessary, and I have spoken of cases where this is desired. But these cases are the exception, although they frequently occur. The rule is that the pessary should be carefully adjusted as regards size and shape to the dimensions and curves of that particular vagina; and that the size and shape should be altered whenever a change in the vagina requires it.

It will be seen that many of the above remarks apply chiefly to pessaries for retro-displacements.

General Rules for the Introduction and Supervision of Pessaries.

The most important rule unquestionably is, always to replace a dislocated uterus before attempting to select or introduce a pessary. Only when the uterus is replaced can the length, size, and shape of the vaginal canal be correctly estimated, and the corresponding properties of the pessary be imparted to it.

This rule applies only to retro-displacements and prolapsus. An anteverted or anteflexed uterus need not be replaced before applying a pessary, because, in these displacements, no rectification of position or cure is expected or attainable by a pessary, the only object of which is to support the displaced fundus until its natural supports, the utero-sacral ligaments and the vaginal column, can regain their tone.

A second precaution, never to be overlooked, is not to leave a pessary in the vagina which is so tight that the finger cannot be passed between it and the vaginal wall. If the vagina is put to the stretch between the bars of the pessary, the latter is too large and will infallibly sooner or later cut into the tissues. Before being introduced, every pessary should be dipped in warm water and then thoroughly covered with vaseline, oil, glycerine, or soap. Its introduction is greatly facilitated by this practice. If it is a complex instrument it may be well to apply a carbolized ointment to prevent its becoming rapidly offensive.

A pessary having been fitted according to the directions above given (the method of introducing pessaries will be described with each instrument), it is important to ascertain whether it really fits the patient under the circumstances when she is most likely to need its support, viz., in the

erect position. Every patient who has just had a pessary introduced, should therefore be examined standing, and told to bear down, crouch, or stoop, in order that the finger in the vagina may learn whether the pessary withstands the pressure and weight which the superincumbent viscera and the necessities of daily life, or the patient's occupation will exert upon it. Only by this erect examination can the physician actually tell whether he has succeeded in selecting a perfectly suitable instrument. Not only at the first visit, but when the patient calls again, at regular intervals to have the pessary inspected, should this examination in the erect position be repeated. Even when it is desirable to move the instrument the patient need not lie down, which is necessary only when the uterus is to be replaced or the old or a new pessary introduced.

The patient should be directed to go about her usual occupations, to walk, carry burdens, in fact to put the pessary thoroughly to the test (provided, of course, her general health and the tenderness of the parts permit), and to return in several days, certainly within a week, in order to have it looked after and any displacement rectified, or a new one introduced, if necessary. The patient should be told that she is wearing a pessary and also how to remove it, which must invariably be done at once if it gives pain. A well-fitting pessary should *never* give pain, unless the rule regarding uterine or para-uterine tenderness has been disregarded. A rule without exception, therefore, is that no pessary should be worn which gives pain, and that every such pessary should be at once removed, as soon as the seat and continuance of the pain shows that it is caused by the pessary. A patient should be able to walk, ride, dance, use the sewing-machine, in fact do anything she could do in health, with a well-fitting pessary. Should she not be able to do all these things, it does not necessarily prove that the pessary does not fit or accomplish its purpose, for the inability may depend on general debility or upon other local conditions than the displacement (subinvolution, hyperplasia, laceration of cervix). But as the object of the pessary is to enable the patient to go about her daily duties, if necessary earn her bread, it should be the endeavor of the physician to accomplish this; therefore, if the first effort and the first pessary are not successful, even though it appears to fit, another and still another should be tried until the proper one is found or the attempt is abandoned.

It has already been stated that a well-fitting pessary should give no pain; but more than this, it should not even cause discomfort; the patient should not be made aware, by any physical sign, that she is wearing such a thing; and still more, it should give her the relief from pain and distress for which the instrument was introduced. This relief may not be instantaneous, it may even be delayed for several days, until the parts have accommodated themselves to the instrument; but if her symptoms were due to the displacement, and the supporter relieves that displacement, the symptoms must inevitably disappear sooner or later. If they do not, then, in all probability, some other affection is the cause of suffering.

Another reason for informing a woman that she is wearing a pessary,

than to enable her to remove it if it gives pain, is that she may possibly not return as directed, and go on for years without knowing that she is wearing a pessary, until finally the foreign body becomes so foreign to its surroundings as to give rise to ulceration, even perforation of rectum or bladder, and to a profuse sanio-purulent offensive discharge, which has been taken for cancer. Thus, but recently, a physician in Maryland removed from a patient, supposed to be suffering from cancer of the uterus, a Hodge pessary which had been introduced, unknown to the patient, five years before, and had worn its way deep into the vaginal walls. Dr. Rodenstein, of New York, lately met with a similar case, also of supposed cancer, which he found to depend on the retention of a large round hard-rubber ring, introduced thirteen years before in Ireland for prolapsus uteri. It was completely surrounded by granulations. In both these cases the physicians had told the patients to return, but not that a pessary had been introduced. Feeling relieved, the patients did not return, and, consequently, no opportunity was given the physicians to remove the pessaries.

But the patient should also be told that the pessary will give her no pain, that she will not be conscious of wearing it, and should not think about it. As soon as she is conscious of wearing anything in her vagina there is something wrong which needs investigation.

If the pessary should protrude from the vulva, the patient should be taught to push it back gently. A pessary may fit perfectly when first introduced, but become displaced by exercise, motion, lifting, defecation. The converse may also hold good, although more rarely, that a pessary which at first does not fit perfectly, after a few days has shaped the vagina to its proportions and now answers very well.

It is advisable to keep a woman in bed, or on a lounge, after introducing a pessary, only when it is intended to gradually accustom the parts to the instrument, or when the parts are too tender to endure the pressure exerted by the pessary when the latter is pushed down by intra-abdominal pressure. In the latter case it will generally be inadmissible to introduce any hard pessary, and the parts need preparatory toughening by cotton tampons soaked in glycerole of alum or tannin. This preparatory treatment may occupy several weeks or longer, daily pledgets being introduced; the posterior cul-de-sac may be very usefully elongated in the same manner.

When the inability to wear a pessary depends upon chronic enlargement of the lymphatic glands situated in the pelvic cellular tissue, or on inflammatory deposits in the latter, the permanent tamponade of the vagina with pledgets of cotton soaked in iodoform and glycerine, with Peruvian balsam to correct the odor, will be found very beneficial in producing absorption of the infiltration and liberation of the adherent uterus, and very grateful to the patient. The vagina should be packed pretty full of cotton and the tampons renewed every thirty-six to forty-eight hours, this treatment to be continued for weeks or months, until either the uterus is replaceable and the parametrium will tolerate a pessary, or until at least the backache and sideache are relieved and the patient feels well, even though her uterus is still displaced.

The bowels should be kept soluble ; otherwise the pessary is liable to be displaced. The loaded rectum weighs down on the pessary, and when the mass of hard feces is at length forced down by a brisk cathartic, it catches in the posterior crossbar of the pessary and dislodges it. Even a perfectly fitting pessary will be displaced in this manner. I have frequently had patients return to me with their pessary in their pocket, saying that it had been displaced, and had come away, or they had removed it while straining during defecation, their bowels not having been moved for several days ; and yet this very pessary had been worn for months before, and had been a perfect fit.

Patients with retroversion and prolapsus should be directed to assure the proper adjustment of the pessary, and temporarily relieve the downward and backward pressure exerted by the uterus on every pessary, by assuming the genu-pectoral position, and expanding the vagina with air (as described in the chapter on Reposition of the Uterus, see Figs. 172 and 173) at least once every day. The best time is on retiring at night, the erect position not being resumed until the next morning.

Every pessary, to a certain extent, irritates the vagina, and, sooner or later, produces a discharge, which will also be more early and profuse if the pessary is made of a destructible substance, such as soft rubber.

Patients should therefore be told to take cleansing injections of soapsuds, or tepid water, or if there be already leucorrhea, a teaspoonful of alum-powder or sulphate of zinc may be added to the pint of water. A hard-rubber pessary may not produce a discharge for several months, but when it does it is well to remember that the instrument may have produced an abrasion of the epithelium at some spot, which calls for its removal. If the discharge of a woman who has been wearing a pessary for some time becomes greenish, or sanious, the chances are very greatly in favor of the pessary having produced an abrasion, and the patient should be informed of this symptom. All pessaries, even those of hard, smooth, impervious material, are liable, in course of time (one or more years), to become incrusted by the deposit on their surface of salts from the vaginal secretion. They then become rough and irritating, produce abrasions, and foul discharge, and should of course be removed. The soft-rubber pessaries are most easily changed, and become discolored, macerated, and rough often after a few weeks. They must, therefore, be more carefully watched, and more frequently removed and cleaned than those made of hard rubber. The least irritating substance undoubtedly is glass, but its brittleness prevents other pessaries from being made of it than the large rings for prolapsus.

In order to avoid this incrustation and abrasion, and to assure one's self that the pessary is still in place and doing good, every patient wearing a pessary, no matter of what construction or material, or for what displacement, should be examined from time to time. This interval with soft pessaries should not exceed two weeks, with hard instruments one or two months. Therefore, always tell your patient that you wish her to report every month or two, or oftener, so long as she is wearing the pessary, and

give her to understand most distinctly the reasons for this request, and the risk she runs if she fails to comply with it. I have frequently seen more or less severe ulceration of the vagina from non-compliance with this direction.

It is advisable, therefore, to remove every pessary, even though it is in place, now and then, inspect the vagina through a speculum, and, if sound, re-introduce the instrument at once. The finger cannot tell that there is an erosion, unless it is deep, although it may be strongly suspected if the finger is tinged with muco-purulent matter on being removed, and no endotrachelitis or cervical laceration is present. I have repeatedly found quite large superficial erosions behind the cervix from pressure of the crossbar, when no pain had been experienced. Some vaginæ no doubt become more easily eroded than others, and those in which the epithelium appears most tender should be most carefully watched.

The failure of a practitioner to thus examine with a speculum, in spite of the complaints of the lady that she had an offensive sanious discharge for some months while wearing a retroversion pessary, caused the patient finally to seek other advice, and I found a large erosion which it took two months to heal.

A pessary need not, as a rule, be removed during menstruation; indeed, it is precisely at that time when the uterus is gorged with blood and heavier than usual, that a support is required. Care should merely be taken to thoroughly cleanse the vagina by injections after the flow has ceased. Complicated pessaries, such as the cup-and-hinge anteversion pessaries of Thomas, are very liable to become incrusted with menstrual blood, which, being attached to the inner surface of the cup, is not reached by the injections; they thus become very offensive, and I have frequently found it necessary to remove such instruments after each menstruation, and cleanse them thoroughly before re-introducing them, in order to prevent erosion of the vagina.

A pessary needs occasional changing even when it has done well. The shape of the vagina alters in course of time, and the old pessary no longer does its duty as well as when first inserted. A new one, appropriately shaped, should therefore be substituted.

It is a good plan also to remove a pessary from time to time and give the parts a rest of a few days, using hot-water injections as an astringent in the meanwhile; or introducing alum or tannin tampons for several days. If no evidence whatever exists of pressure by the pessary, this rule, of course, need not be observed.

Finally, the pessary may be removed after a variable lapse of time, in order to see whether a cure of the displacement has been effected. This time varies from three months to as many years. A cure may be expected chiefly in retro-displacements; in prolapsus of the uterus and vagina, but rarely if the displacement was of long standing. Ante-displacements are restored by but one pessary with which I am acquainted, Gehrung's, for it gradually retroverts the uterus.

Prolapsus uteri may be cured unintentionally by a pessary, which

has been allowed to remain so long that it has produced ulceration extending over more or less of the vaginal vault. When the ulceration heals, the uterus and vagina are retained by the resulting cicatrices. Such a case recently came under my notice, a round glass disk having been retained for five years.

If a pessary has become fastened in the vagina by granulations, and is covered by vaginal tissue, it may be very difficult to remove. If a ring-shaped pessary, it may lie in a canal to which there is no access, except by cutting through the overlapping tissue at one spot, clipping the branch of the pessary with strong nippers or bone forceps, or dividing it with a chain-saw, and then seizing it firmly in a forceps, withdrawing it with a rotary motion until the opposite part of the pessary arrives at the opening; this is also clipped and each half of the pessary then withdrawn separately.

Sexual intercourse is not prohibited by the presence of a pessary. Indeed, if this were so, how could women, sterile through uterine displacement, be cured of their sterility? Of course, I mean pessaries which do not obstruct the vagina so as to prevent intromission and the entrance of the spermatozoa into the cervical canal. Such are those chiefly used for anterior and retro-displacements. Sterility due to displacement is often cured by wearing such a pessary. A certain amount of caution on the part of the husband is of course advisable, in order that the pessary may not be dislodged or the male organ or female parts injured.

After the removal of a pessary, cleansing or astringent injections may be required for a few days; or the hot vaginal bath to preserve and promote the contractility of the tissues.

An opinion as to the permanency of the replacement of the uterus by the pessary after removal of the latter should be guarded, since the uterus may remain replaced for a few minutes, hours, even days, and then on any more than usual exertion or strain by the patient return to its former displaced position. After removing a pessary permanently, it is therefore always best to direct the patient to call again in a week or thereabouts, when an examination will reveal whether she is cured of her displacement or not.

In concluding these remarks on the general and special rules for the application of pessaries, I will merely repeat what probably has already become sufficiently apparent, viz.: that the mere introduction of a pessary by no means concludes the connection of physician and patient for that particular affection. The patient should be informed that the proper fitting and supervision of a pessary requires a certain number of interviews; that a different size or shape may be called for sooner or later; that only a careful watch over the pessary will prevent its doing injury; and that, finally, the cure of a displacement of the uterus is a tedious and difficult matter, and well worth the trouble, attention, and expense the patient is obliged to devote to it. All these particulars are necessary, since many patients think that all they need do to be cured of their displacement is to have a pessary introduced, and then go about their business. The danger and uselessness of such a course have been repeatedly pointed out.

a. *Pessaries for Ante-displacements of the Uterus.*

Pessaries for the support of the ante-displaced fundus uteri generally possess one mechanism which inserts itself between the symphysis pubis and the uterus, and another which is intended to draw the cervix forward and thus tilt the fundus backward. This is the only correct principle upon which anteversion pessaries should be constructed. This traction may be exerted either by a ring encircling the cervix, or by the transverse or upward expansion of the anterior vaginal pouch. The ring which encircles the cervix should not be so large as to distend the posterior pouch of the vagina; for if it does, it will draw the cervix backward, tilt the fundus still more forward, and thus counteract the supporting effect of the pessary.

Pessaries which act in this faulty manner are those of Thomas, seen in Fig. 186, the so-called "buckle pessary;" that of Hitchcock, an elastic ring covered with soft rubber, lately also made of hard rubber (Fig. 187), and to a less extent that of Graily Hewitt (Fig. 191). Theoretically the best anteversion pessary, in my opinion, is that of Gehrung (Fig. 182). A very good pessary, also acting on the correct principle of distending and elevating only the anterior pouch, is the "cup-pessary" of Thomas (Fig. 189). Any pessary which supports the uterus in any way, such as a simple elastic ring (Fig. 208), or a perforated block of soft or hard rubber, will also give relief in anteversion. But these latter instruments will act only by lifting up the whole uterus, which I have already stated to be usually somewhat lower in the pelvis than normally, in anteversion. The fundus alone is lifted up only by pessaries properly constructed for that purpose.

The difference between anteversion and anteflexion pessaries is but slight. Those for anteflexion, being required to straighten the uterus as well as to lift up the whole organ, need to possess a higher anterior bar than in anteversion, and a ring to draw the cervix forward, for there is generally some anteversion with the flexion. For this purpose Thomas' closed cup-pessary (Fig. 188), and Graily Hewitt's cradle-pessary (Fig. 191), have best satisfied me. But it may be as well to understand that no vaginal support will straighten an anteflexed uterus. Only an intra-uterine stem will accomplish this perfectly. The benefit derived from pessaries in anteflexion probably depends mostly upon the relief of the anteversion. But I believe that the constant pressure of the smooth wall of Thomas' cup-pessary against the flexed anterior wall may, after a while, somewhat mitigate the acuteness of the angle. A *cure* of an anteflexion is not to be expected by a vaginal support.

One of the best anteversion pessaries, therefore, in my opinion, is that of Gehrung, the "double horseshoe" pessary. It is simply a single-lever Hodge pessary bent upon itself, one bar being slightly longer than the other. This pessary rests on the floor of the pelvis by its two lateral curves R and L, the superior and inferior arches S and I being in the

anterior vaginal pouch between fundus uteri and symphysis pubis. Obviously, there can be no anteversion when this pessary is properly fitted. Gehrung himself describes the pessary as resting with its whole lower arch on the floor of the pelvis, and the uterus reclining against its superior curve, as shown in the cut taken from Gehrung's article on "Mechanical Gynecology." But my experience is that the pessary rests, as already described, on the curves R and L, and therefore stands more upright, whereby it elevates the anterior pouch still more. The uterus then leans against the whole superior arch, not within it, as Gehrung draws it. By this position, coition is rendered possible, which was not practicable in the other position unless the largest size was used. But the expansion of the vagina being lateral, and the peculiar shape of the horseshoe also giving the pessary the greatest separation of the bars in a transverse direction, there is no obstacle to the immissio penis, which would exist if the pessary lay as its inventor describes it. This modification of the author's directions was not sought at first, although I recognized the disadvantage as regards coition, but established itself; for I found that gradually the pessary always assumed the position which I now give it. Seeing that the coition difficulty was thus removed, and the fundus thoroughly supported, I have since introduced it in this manner. The point of support of this pessary is the posterior vaginal wall and perineal body, its resting-place the symphysis pubis, against which the inferior arch presses. The superior arch supports the uterus. No part of the pessary extends into the posterior part of the vagina.

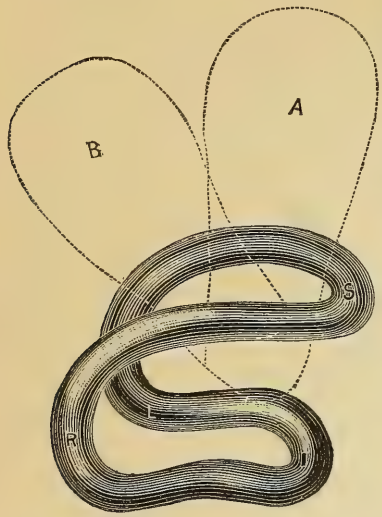


FIG. 182.—Gehrung's Anteversion Pessary. A, Anteversion; B, Retroversion (Gehrung).

The construction of the pessary is apparent from the cut. It will be noticed that the superior arch projects in front over the inferior. The elevation of the fundus is increased by this projection. By separating the lateral branches its retentive power is increased (Fig. 184).

Gehrung's pessary comes in five different sizes, the smallest of which can be introduced into any virgin with normal hymeneal orifice; the largest is used for very large vaginæ, prolapsus, and cystocele.

The manner of introducing it is as follows: The pessary is placed on the table, or the palm of the left hand, with the superior convex arch S downward, the inferior arch I above, the open part (curves R and L) pointing toward you; seize curve L with thumb and forefinger of your right hand, separate the labia with the same fingers of the left hand, the patient being in the dorsal position, and insert curve R into the vagina to the right of the patient, until three-fourths of the instrument is buried

within, then rotate it on point R as on a pivot, by pushing curve L toward the fourchette and the left side of the patient, so that at the same time the curve L slips into the vagina, the arch S will turn upward under the body of the uterus, and the arch I downward to the os pubis. Then press the uterus gently up with the pessary, and see that the curves R and L rest squarely on the posterior vaginal wall.

If the vagina is so large, and its walls so lax that the pessary seems likely to slip down or out, a pledget of cotton, soaked in glycerole of alum or tannin, may be placed between the bars of the pessary for several days. Or, the branches of the pessary may be separated a little more, so as to distend the vagina laterally still more. I have several times seen this pessary elevate the uterus so well as actually to retrovert it in the course of a few weeks. In that case, it should be removed for a few days. In several instances I was obliged to remedy the retroversion by a lever-pessary.

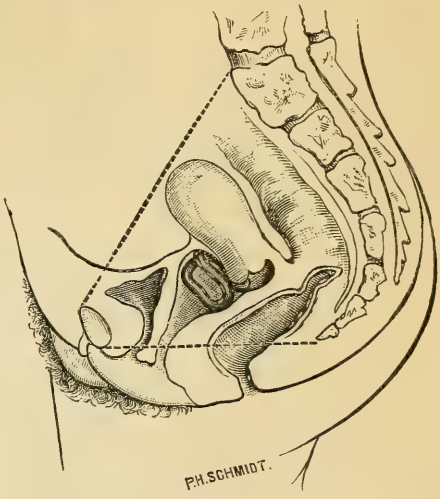


Fig. 183.—Position of Gehrung's Pessary in Anteversion and Cystocele (P. F. M.).

If the pessary is too small, or has not been properly adjusted, its superior (longer) arch may slip behind the cervix, which organ is then found between the two curves of the double horseshoe. The pessary then, of course, fails in its object, and may even give pain. By using an instrument with more widely separated lateral branches, this accident will be avoided.

While my first experience led me to pronounce this instrument of Gehrung the best one for anteversion, I regret that subsequent more extended observation has not confirmed the expectations which I at first entertained. I still find it the best means for the retention of a large cystocele or of an anteverted uterus when the vagina is capacious and a large pessary with widely spread branches can be used; but in vaginæ of moderate size, and with the smaller pessaries, I have found it to be almost the rule that sooner or later, generally in a few weeks, the pessary turns so as to present its concavity toward one side or the other. Repeated replacement only resulted in the same occurrence, and I have within the past year reluctantly lost much of the faith I formerly had in the pessary for anteversion. I still occasionally use it for that purpose, but find the open cup-and-hinge pessary of Thomas much more efficient and reliable.

The anteversion pessaries, constructed by adding a movable anterior bar to a Hodge lever-pessary, all possess the same defect, that the posterior arch stretches the posterior vaginal pouch and counteracts the upward action of the movable bar. While they undoubtedly elevate the fundus

and the whole uterus, they do so at the expense of a considerable dilatation of the vagina, and the pressure necessarily exerted by the anterior movable bar is likely to produce excoriation.

In retroversion of the anteflexed uterus they possibly may do good, although generally the posterior pouch is too shallow to give the pessary a sufficient purchase to hold or lift up the fundus.

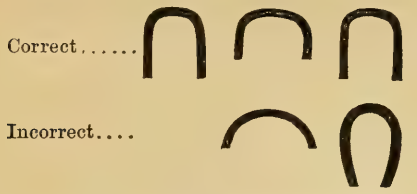


FIG. 184.—Diagram Illustrating Separation of Lateral Branches of Gehrung's Pessary to Increase its Retentive Power (Gehrung).

FIG. 185.—Woodward's Pessary for Retroversion with Anteflexion.

The anteversion pessary, shown in Fig. 186, is a modification of Hodge's lever, again modified by Thomas, and is introduced closed. The patient may occupy either the dorsal or lateral recumbent position. The difficulty about this pessary is that the length of the movable bar renders it difficult to open and separate it when the pessary is in the vagina. This is done by passing a piece of tape around the movable bar, and seizing both the ends with the right hand outside of the vulva. The left hand separates the labia, and the pessary is introduced closed by the right hand, with the upper end and movable bar foremost. As soon as the arch reaches the cervix, the left index-finger pushes the posterior arch backward and upward under and behind the cervix, while simultaneously the right hand seizes the tape, and by it pulls the movable bar forward as far as it will go. This is the difficult part of the maneuvre, as the tape is liable to slip; besides, the rapid forcing up of the anterior vaginal wall by the movable bar gives pain. If introduced on the side, the pessary is inserted with its concave surface downward, and passed on until the anterior lip of the cervix is touched, when the left hand (this time) pulls forward the bar by the tape, and the right index-finger lifts the posterior arch of the pessary over and behind the cervix. This maneuvre will be fully discussed in describing the application of lever-pessaries. The uterus now rides between the posterior arch and the movable bar, as in a saddle, or as though suspended by two ropes. This pessary is removed by drawing on the subpubic arch with the index-finger, when the buckle will fall back as the posterior arch is drawn down, and the pessary is removed closed, as it was introduced. The great disadvantage of this pessary is the tendency of the movable bar to be displaced backward by the motion of the anterior vaginal wall in respiration, and varying fulness of the bladder. The cervix is then squeezed between the movable bar and the posterior arch, and may

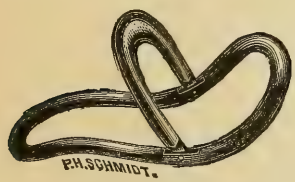


FIG. 186.—Thomas' Anteversion (Buckle) Pessary, open. The crosspiece is movable to the right for insertion.

be so severely compressed as to become ulcerated, and give rise to great pain. A rubber band has been attached to the top of the movable bar and the anterior pointed curve, to draw the bar forward, and prevent its displacement; but this band easily decays, and becomes offensive. This pessary is but little used now, except where marked anteversion and descensus are combined.

A useful pessary (the device of Thomas), chiefly when the vagina is roomy and the perineum destroyed or flabby, is a Hodge *single* lever with a fixed or movable bar attached (similar to the instruments shown in Figs. 185 and 186), which projects under the pubic arch as a means of fixing the pessary, while the upper broad bar presses up the anterior vaginal wall. It is introduced closed in the back or lateral position, and the movable bar and posterior arch are separated by a tape precisely as in the foregoing instrument. It has served me much better for cystocele than for simple anteversion, and is less liable to injure the anterior wall than the buckle instrument. This instrument is removed by seizing the fixed, broad anterior arch and drawing it downward and sidewise through the vaginal orifice, when the movable bar is tilted backward, and the pessary is withdrawn closed.

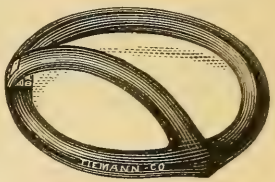


Fig. 187.—Hitchcock's Anteversion Pessary.

Hitchcock's elastic ring-pessary is made of watch-spring covered with soft rubber, with a cross-bow, which is to go in the anterior vaginal pouch. It does good service in relaxed vaginæ, and I had a patient wear one with great comfort during the summer's sojourn in the Adirondacks. But it has the disadvantage of all elastic spring pessaries in that it keeps the vaginal walls on a constant stretch, and thus tends to weaken them, and that its soft covering is liable to become roughened and offensive. Besides, it distends the posterior vaginal pouch. It is introduced on the back or side by simply compressing the ring and allowing it to expand slowly when within the vagina. The finger then pushes it into place. It is now made of hard rubber, and thereby loses two of its objections, the elasticity and perishability.

Of pessaries which are more adapted to anteflexion (any of the above may also be used for flexion), those of Thomas, constructed on the principle of the cup-pessary or with a long movable anterior bar, are the best—at least, I have had the most experience with them, and like them better than any others. The pessaries shown in Figs. 188 to 190 work on the same principle, the cervix being held in the closed or open ring, while the body rests against the smooth shell of hard rubber. The pessary is prevented from turning in the vagina by an anterior movable bar which rests against the inner surface of the pubic arch. The pessary is introduced on the back or side, the movable bar being extended (see Fig. 189) and the broad top of

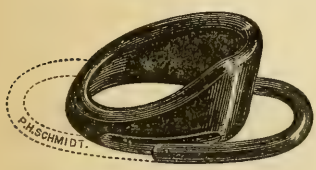


Fig. 188.—Thomas' Closed Cup Anteflexion Pessary, with Hinges Sunk, so as to Prevent their Indenting the Vaginal Wall (P. F. M.).

the shell being inserted sidewise into the vagina until the tip touches the cervix (Fig. 190), when the index-finger quickly pushes the posterior segment of the ring backward, and the hinged arch becomes horizontal. Slight adjustment with the finger fixes the cervix in the cup and places the movable bar along the anterior wall. In the pessary with open cup simple pressure against the anterior vaginal pouch with the top of the cup, the direction of the force being directed from the hinges slightly backward, will cause the hinges to revolve and the movable bar to approach the floor of the cup. One advantage of this open variety is the non-compression of the cervix in the ring. But I have found it chiefly useful in anteversion, where I generally use it in preference to the closed ring or any other pessary. The removal is easily accomplished by hooking the finger into the movable arch and gently drawing on it, when the hinges will revolve and the pessary become extended as it is withdrawn.

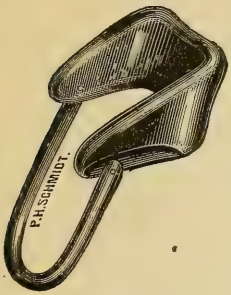


FIG. 189.—Thomas' Open Cup Anteversion Pessary, as Introduced and Removed, with Hinges Sunk (P. F. M.).

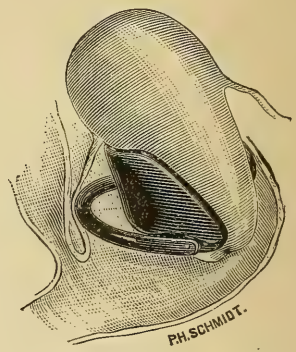


FIG. 190.—Thomas' Open Cup Anteversion Pessary in Position (P. F. M.). The anterior vaginal wall in this cut is incorrectly drawn.

All these hinge instruments may be advantageously inserted through a Sims speculum, and their exact position be thus seen. Indeed, if the woman is a pluripara, the pessary can generally be inserted through the speculum in a closed condition and be thus adjusted by the finger.

The great objection to all these complicated hinge and spring instruments is that they very readily become offensive, and indent the vagina. They, therefore, require very careful watching, and special cleanliness. The hinges particularly are liable to indent the posterior wall. To avoid this I have had them sunk, as shown in Figs. 188 and 189.

Numerous other anteversion and anteflexion pessaries have been devised, chiefly by Dr. Thomas, also by Drs. Pallen, Beverley Cole, Janvrin, Galabin, Gervis, etc., which all act on a principle similar to that shown in Fig. 190, that is, by directly elevating and supporting the fundus uteri. The same object is intended by Gehrung in his anteflexion pessary constructed on the principle of his anteversion instrument, with the addition of a plate connecting the branches of the superior arch. It is introduced precisely like the anteversion pessary ; of its utility I have no experience.

A pessary greatly in vogue in England, and also somewhat used here, is

Graily Hewitt's anteversion or anteflexion "cradle" pessary (Fig. 191). It is introduced sidewise, and as soon as the crossbar or the apex of the curves is within the vagina the long bar is pushed behind the cervix, and the other arch rests along the anterior vaginal wall. The uterus then rests against the apex or crossbar, with the cervix in the posterior curve. I formerly used this pessary quite often, but began to discard it when I had met with several instances where its crossbar had deeply indented the vaginal wall.

Pessaries which are built to conform to the shape of the vagina, and fill but not distend the canal, are those of Hurd (hard-rubber), Hoffmann (soft-rubber), and Trask-Page (inflated soft-rubber dumb-bell). These pessaries are supposed to support the uterus, whether its fundus be ante- or retro-displaced, and doubtless do so satisfactorily in many cases. In the Hurd and Hoffmann, the cervix fits into a hole in the centre; with the Trask-Page, one end is before and one behind the cervix. I have no experience with these pessaries.

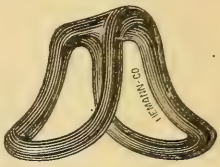


Fig. 191.—Graily Hewitt's Anteflexion Pessary with Crossbar. The instrument is also made without the crossbar.

I have not exhausted the list of pessaries for anterior displacement, but have given those which are most practical and most in use. The ingenuity of the practitioner must help him to devise new or modify old ones, to suit his cases.

There are, of course, various sizes of all these pessaries which are not classified, and therefore cannot be designated. As a rule, three sizes are made of each pessary, one for virgins, one for married nulliparæ, and one for multiparous women.

b. *Pessaries for Retro-displacements.*

Nearly all pessaries for retro-displacements of the body of the uterus are constructed on the same principle, that of the double lever, the short strongly curved arm of the lever being behind the cervix in the posterior vaginal pouch, the long, mildly curved arm in front of the cervix along the anterior vaginal wall (see Figs. 192 and 193). The fulcrum of these pessaries is at the deepest point of the posterior vaginal wall, where the canal curves upward toward the posterior pouch. It is not a fixed fulcrum, but changes with the position of the patient. The lever principle on which these pessaries act has already been described. It is the only truly

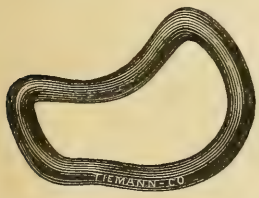


Fig. 192.—Hodge's Double Lever Retroversion Pessary.

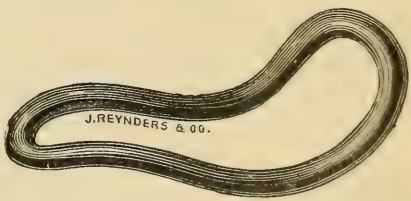


Fig. 193.—Albert Smith's Retroversion Pessary, Front View (gentle curve).

physical law observed in the mechanical support of the uterus, which at the same time corrects the displacement and attempts to cure it permanently. The parent instrument of this variety is the original closed double-lever pessary of Hodge. It is still used in many cases, particularly where the vagina is large and roomy, with dilated walls and patulous orifice. The broad anterior bar of the pessary rests against the pubic bones, and aids its retention. In this case the fulcrum, or rather resting-place, is also at the symphysis pubis. As a supporter for a prolapsed and retroverted uterus, this broad pessary is often very serviceable, correcting both displacements.

The open lever pessary, in which the anterior crossbar is wanting, is no longer used, because the two points are liable to injure the anterior vaginal wall.

The Hodge pessary is liable to turn in the vagina, so as to lie diagonally or transversely. To obviate this Dr. Albert H. Smith, of Philadelphia, modified the original Hodge by lengthening it, to conform more to the shape of the vaginal canal, and by making the anterior arch more pointed, so as to resemble a beak. This pointed extremity reaches quite or almost to the pubic arch, but never under or beyond it. A Smith pessary, which projects beyond the pubic bones, is too long or has slipped down from behind the cervix. The Albert Smith pessary is now the variety most commonly used, and has, to a great extent, supplanted the original Hodge. It certainly is adapted to the greatest number of cases. The Smith pessary is made in many different sizes and curves, too numerous for description. A useful modification of it is that where the side-bars at the short curve are slightly more separated instead of running parallel to a point. In relaxation of the posterior vaginal wall, and short, but capacious vaginæ, this modification, by which the pessary is somewhat shortened, increases its retentive power. In some of these pessaries, the anterior beak is more sharply bent downward so as not to impinge against the symphysis pubis. While the urethra is spared by this change, the pessary is rather more liable to escape through the vulvar cleft, and may interfere with coition.

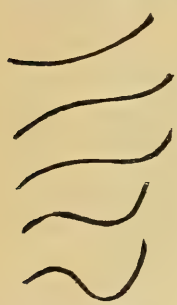


FIG. 194.—Different Curves of Hodge or Albert Smith Pessaries (P. F. M.).

Another less known and therefore less popular modification is that known as Sims', the peculiarity of this pessary being that it is more narrow than the Hodge, but of equal breadth at both ends. It answers very well in cases where the greater breadth of the Albert Smith or Hodge distends the vagina too much.

Another excellent modification, chiefly useful in cases of shallow posterior pouch, is that of Emmet; it is less curved, flatter than the Smith (very similar to the variety shown in Fig. 193), and serves as the basis from which Emmet models the various shapes he considers necessary. He has had six sizes made, and finds them to answer, with minor modifications, for the large majority of cases. It possesses the great advantage of

not forcing the posterior vaginal pouch too far upward, and not pressing too firmly against the posterior surface of the uterus so as to retroflex it. It is also a good instrument for slight descensus of the uterus. I have found many patients derive comfort from it, in whom the Smith pessary proved too powerful a corrective. A similar pessary is the oval hard-rubber ring of Hewitt, the lever action of which, however, is but slight.

FIG. 195.—Hewitt's Retroversion Pessary.

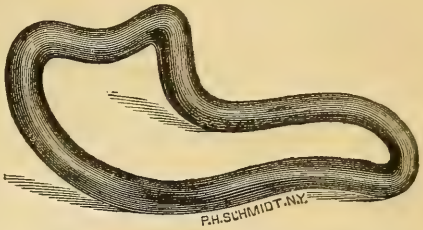


FIG. 196.—Gehrung's Modification of Albert Smith's Pessary.

A very excellent modification, which, may decidedly be called an improvement, is that shown in Fig. 196. It consists, as is seen, in a central depression of the upper curve, in which the body of the uterus rests and by which the pessary is prevented from slipping sidewise, as readily happens with the ordinary round curve. Another advantage is the higher lateral tension of the posterior pouch, whereby pressure is taken from the centre of the pouch, and the prolapse of the ovaries in Douglas' pouch is rendered less likely. An objection is the pressure of the two lateral horns of the posterior curve, which may, in course of time, give pain, and produce soreness, especially if one or the other broad ligament is tender or contracted.

For the purpose of distending and filling the posterior vaginal pouch, and preventing prolapse of the ovaries, Thomas has changed the slender posterior bar of the Smith pessary into a thick bulb (Fig. 197), and has at the same time lengthened and narrowed the pessary. The addition of the bulb is an advantage ; the lengthening and narrowing, however, diminish its chances of retention. These bulb-pessaries are now made hollow and light, being cast in a mould, but cannot be heated and changed, except very slightly in their long diameter. Formerly they were solid, the bulb being a separate piece, and could not be altered at all. I have had them made to order for special cases, shortening and widening the lateral bars, and have then found this variety very useful, especially in cases of retroflexion of a flabby uterus, where the body always curled backward over the slender posterior bar of the Smith pessary ; besides, in ovarian prolapse. These pessaries differ from the ordinary Albert Smith variety only in having a thick bulb instead of a thin bar. They are now

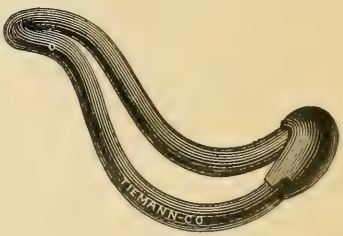


FIG. 197.—Thomas' Bulb Retroflexion Pessary.

kept in stock in sets by Ph. H. Schmidt, instrument-maker, under the name of the Mundé retroflexion pessary. They are shorter and wider than the Thomas bulb pessaries, which I find too long for the majority of vaginæ, although excellent as supporters.

A useful form of this pessary, in certain cases of heavy (subinvoluted or hyperplastic) uteri with a steady backward tendency of the fundus, is that in shape of the capital letter U; the uterus rides in this pessary as in a saddle, the cervix being on a level with the lower curve; a slight downward bending of the point of the anterior arch will obviate the otherwise probable pressure on the urethra.

All these pessaries are of course made of hard rubber.

By making the posterior bulb broader, rather square at each end, a greater lateral tension of the posterior pouch may be obtained, and prolapsed ovaries thus lifted up. The Albert Smith pessaries are also made of elastic strings of brass threads covered with hard rubber (Otto & Sons), and are then springy and slightly flexible. They are very useful in cases where a steady unyielding pressure gives too much pain, and may be employed to habituate the parts to a pessary. I often use them as forerunners to a hard pessary. The malleable copper rings covered with soft rubber, which can be modelled to any shape, possess merely the advantage of malleability; their soft covering renders them unfit for constant use. A pessary which comes under this category, but acts on the single-lever principle, is that of Noeggerath. The posterior bar is made either slender or bulbous; the anterior bar always has a urethral depression. It has answered very well with me when I have been unable to shape a Smith to a capacious flabby vagina with gaping orifice.

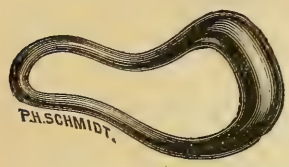


FIG. 198.—Mundé's Bulb pessary for Retroflexion and Prolapsed Ovaries.

Dr. Studley, of New York, has devised a Smith pessary with a ring attached to the posterior arch, into which the cervix is to fit so as to insure the backward fixation of the latter, while the lever action elevates the fundus. I have not used it, but cannot help wondering whether the lever action is not interfered with by the ring. It would seem to me a useful instrument in certain cases of retroversion of the anteflexed uterus, where the flexure of the cervix must be overcome by backward traction while the fundus is elevated. For this displacement I have found it difficult to secure a supporter.

The so-called "sleigh" pessary, which is claimed by Chrobak, of Vienna, and in modified form by Veuillot, of Paris, and Schultze, of Jena, is, no doubt, an excellent instrument for those cases in which the cervix shows a tendency to slip forward instead of backward, as the fundus is elevated. The cervix is held back by the reflected anterior bar, which of course must not be so near the posterior bar as to leave no room for the cervix in the pessary. The modifications mentioned consist merely in the increase of reflexion of the anterior bar.

All these lever pessaries are liable to press more or less severely on the

rectum, when the body of the uterus shows a tendency to backward displacement while the pessary is in the vagina. The only means of overcoming this pressure is to carefully measure the vagina, and adapt the curves of the supporter to the dimensions and curves of the vagina. Special rules cannot be given.

Introduction.—No retroversion pessary should be introduced until the uterus has been replaced. The introduction may take place in the dorsal position, or in the left latero-abdominal decubitus. Formerly, the dorsal was universally employed, the pessary being guided sidewise between the labia by either hand, the posterior sharp curve ahead, until the cervix was reached, when the index-finger depressed the posterior arch until it was below the cervix, and then pushed it up into the posterior pouch. This plan had two great disadvantages: 1. The rule to replace the uterus cannot well be observed in the dorsal position, because the displaced fundus often refuses to become anteverted by vaginal manipulation, and if replaced, as of course occasionally occurs, will at once fall back again as soon as the finger is withdrawn. The sound, it is true, can be and has been used to replace the uterus, the pessary being slipped into the vagina over the sound, which is not withdrawn until the pessary is in place. I have already stated that the reposition of the uterus by the sound is admissible only when the fingers fail to accomplish it. 2. The index-finger often finds great difficulty in pushing back the posterior arch behind the cervix, partly because in pessaries with sharp posterior curve it is no easy matter to press the arch so far backward and downward, and chiefly because the parts are so slippery that the finger slips from the slender posterior bar.

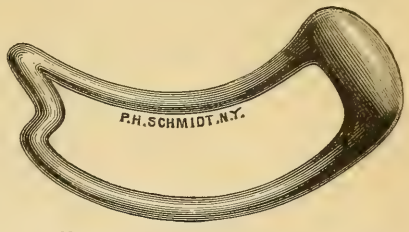


FIG. 199. — Noeggerath's Retroversion Bulb-pessary.

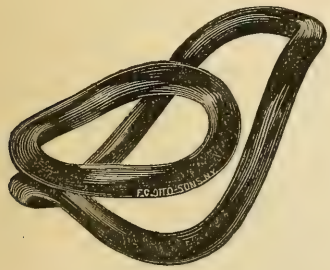


FIG. 200.—Studley's Ring-pessary for Retroversion of the Anteflexed Uterus.

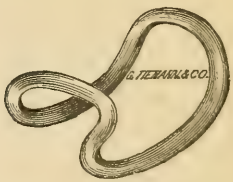


FIG. 201.—"Sleigh" Pessary, for Retroversion.

I have, therefore, for a number of years introduced all lever retroversion pessaries in the latero-abdominal position, first replacing the uterus by the fingers, for which maneuvre this position has special advantages. In cases of extreme difficulty the knee-breast position was used. And I have

reversed the method of introducing the pessary, inserting it with the concavity of the long curve downward, that is, upside down, then turning and adjusting it. The method which I pursue, and which I have not seen described elsewhere, but which no doubt is practised by many gynecologists to whom naturally its simplicity and efficiency has recommended it, is the following:

The patient being in Sims' position, the uterus is replaced by two fingers in the usual way. The dimensions of the vagina are then taken and a properly curved pessary of correct size is chosen. This is dipped in warm water and then in vaseline or any emollient, and grasped between the thumb and first two fingers of the right hand, with the posterior arch

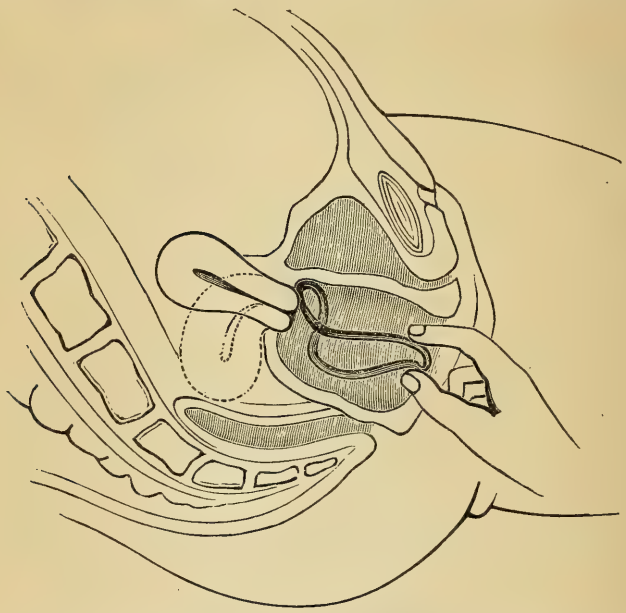


Fig. 202.—Introduction of a Lever-pessary (Albert Smith's). Patient in left Latero-abdominal Position. First step (P. F. M.).

pointing downward. The labia are well separated by thumb and forefinger of the left hand, the operator standing slightly behind his patient so as to admit the light (the pessary can, however, be quite as well introduced under the clothes) and the curved arch of the pessary, P (see Fig. 203), is gently inserted between the labia until it enters the vaginal orifice proper. The resistance of the perineum (which is quite strong in nulliparæ or if the pessary is large) is easily overcome with but little pain by steadily and gently pressing back the pessary as soon as its posterior arch is within the vagina; or the index-finger of the left hand may do this. As the perineum is retracted, the pessary is pressed inward until its posterior bar rests in front of the cervix in the anterior vaginal pouch. The transverse diameter of the pessary corresponds to the longitudinal diameter of the vulvar cleft. This is the first step (Fig. 202).

The second step begins by gently rotating the pessary, so that its right-hand bar, R (Fig. 203), stands slightly higher than the left-hand bar, L; the pessary crosses the vulvar cleft diagonally. This is done in order to place the right upper curve of the posterior arch, RP, more in reach of the finger. The index-finger is now introduced *above* the pessary, and with palmar surface upward passed *under* the posterior arch P, and the point RP, seized by the first joint of the finger. It is important that the finger should be assured of a perfectly firm grasp of this spot of the pessary. If necessary, the left hand may seize the projecting beak of the pessary A, and rotate the instrument to suit the internal finger. The first joint of the right index-finger having firm grasp of the pessary at RP, and the operator standing behind the patient's sacrum, with his left arm resting on her right hip, lifts the arch P up, draws it slightly toward himself and the posterior vaginal wall, and by one rapid twisting motion, from the metatarso-phalangeal articulation and the wrist, rotates the pessary slightly about

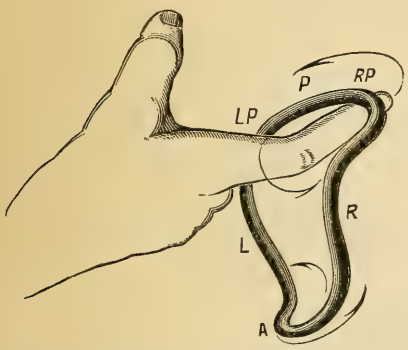


FIG. 203.—Introduction of Lever-pessary (Albert Smith's). Second step, first action. The arrows show the direction of rotation of either end. Letters correspond to diagonal axis of vagina (P. F. M.).

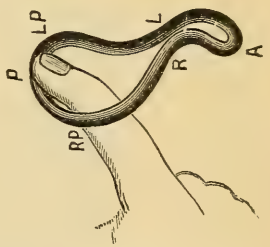


FIG. 204.—Introduction of Lever-pessary (Albert Smith's). Second step, second action. Letters correspond to longitudinal axis of vagina (P. F. M.).

its longitudinal axis and lifts it behind the cervix (Figs. 203 and 204). If the cervix is long, or situated low in the pelvis, the pessary will spring into the posterior pouch almost with a snap. The third step is to fix the posterior arch P firmly behind the cervix, by placing the index-finger on the beak A, and depressing it toward the perineum, thereby tilting up the posterior arch and assuring the replacement of the uterus (Fig. 205).

This method of introducing a lever-pessary is easy, rapid, and entirely painless, unless too large an instrument be used, or the cervix be so low as to be touched by the pessary during the second step of backward rotation. The difficulties which I have seen beginners encounter consisted in pain during the passage through the vaginal orifice, and failure to seize the proper portion of the instrument with the finger in the second step (Fig. 203, RP). The pain at the orifice depended entirely upon the omission to push back the perineum, and the consequent pressure by the right bar of the pessary on the sensitive vestibule. The failure to grasp the right curve, RP, with the finger was due to non-comprehension of the principle of the

method, and omission to rotate the pessary with the left hand at the beak, so as to have RP within easy reach. The usual fault was that the pessary was introduced too far, and the arch RP could not be easily reached by the finger. The result of not securing a firm grasp on the arch at RP, was that the traction was always exerted nearer the other curve of the arch LP (see Fig. 203), and the operator was astonished to find that he had placed the pessary behind the cervix, with the arch P pointing downward toward the rectum, that is to say, upside down. Of course, a pessary so placed could but give pain and do harm. Occasionally, if the parts are too thoroughly lubricated, the finger may slip from the posterior arch and the maneuvre fail for the moment, even in experienced hands.

FIG. 205.—Introduction of Lever-pessary (Albert Smith's). Third step (P. F. M.).

The double lever pessaries, like Hodge's, Smith's, Thomas', Sims', are best introduced in this manner, but the single levers, like Noeggerath's, are also easily applied as described.

The usual method consists in inserting the pessary with the posterior arch and larger concavity pointing upward, passing it in front of the cervix, and then, with the index-finger pressed against the cross-bar *under* the pessary, guiding the posterior arch behind the cervix. The disadvantage of this method in the want of purchase of the finger on the slender bar has already been referred to.

The plan here described at length has the advantage of giving the index-finger a hold on the superior crossbar of the pessary, which invariably enables the operator to place it behind the cervix if he has chosen his case and his instrument properly.

The steps briefly repeated are: 1. Seize the pessary with two fingers of right hand, gently insert it between the labia, which are separated by the left hand. Press back the perineum and insert the pessary till it touches the anterior wall of the cervix. 2. Rotate it by external hand, if necessary, so that its upper end is conveniently reached by the right index-finger; place the latter under the right upper curve of the posterior arch, firmly seize it and lift it backward and upward behind the cervix by a twisting motion. 3. Depress anterior beak to fix posterior bar behind the cervix.

As a rule, the left hand is not needed to manipulate the beak of the pessary.

If the pessary is large or sharply curved, like the U form spoken of, and the vaginal orifice comparatively narrow, it is advisable to retract the perineum to its utmost by the Sims speculum, and introduce the pessary through the speculum. In fact, it is usually good practice to examine the relations and appearance of a retroversion pessary through Sims' speculum, and ascertain by the eye, as well as by the touch, whether it interferes with the motion of the uterus and vagina during respiration or not.

This minute description of how to introduce and fit a lever-pessary is by no means unnecessary. The limits of the majority of text-books prevent these details from receiving sufficient consideration, and the young practitioner find himself totally at a loss for information as to which end of a pessary is to be inserted first, and which curve points up or down. The result is that lever-pessaries are often inserted with the sharp curve in front of the cervix, or pressing downward upon the rectum. I have repeatedly removed pessaries which had been introduced in this manner by other practitioners. In no one manipulation did I find the gentlemen who for years joined my private classes in practical gynecology (nearly all of them older practitioners) so deficient, and therefore so anxious to learn, as in this matter of selecting, introducing, and adapting pessaries.

I am convinced that the time spent in carefully perusing this chapter will not be wasted, and trust that it will enable practitioners who have experienced the usual difficulties to overcome them with but little trouble.

After introducing a pessary, retro- or anteversion—in fact, any pessary—the patient should be examined in the erect position in order to determine whether the instrument is too large or too small, whether it projects from the vagina—in short, whether it fulfils its purpose of supporting the uterus during the position when such support is most needed.

The removal of these retroversion pessaries is easily accomplished by physician or patient, by simply hooking the index-finger into the anterior beak or bar, making gentle, steady, downward traction, and as the instrument is felt to yield, turning it side upward, and withdrawing it in this position from the vagina. By placing one foot on a chair, or crouching, the removal by the patient herself is facilitated.

A retroversion pessary on essentially a lever principle is that of Fowler (Figs. 206 and 207); the perforated tongue goes in front, the bevelled border behind the cervix, and the fundus is tilted up by the downward pressure of the anterior tongue in the erect position. I have seldom used it,

but it is highly recommended by its inventor and by Dr. Sims, and I can readily imagine how in retroversion with descensus it might prove useful. From its construction I should have supposed it to be designed for anteversion, the long tongue supporting the uterus. Dr. Thomas, in his latest edition (November, 1880), calls it "Fowler's pessary for anterior displacements;" the directions of the inventor, however, are for retroversion.

A retroversion pessary, constructed for another object, is the galvanic lever-pessary of Hanks for amenorrhea, the posterior portion of which is composed of alternate copper and zinc beads strung on copper wire, which

FIG. 206.—Fowler's Retroversion Pessary.

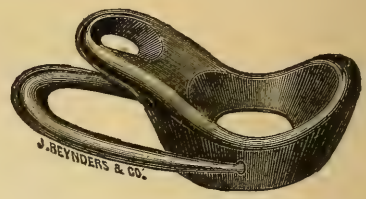


FIG. 207.—Fowler's Retroversion Pessary with Anterior Movable Bow.

in the anterior part is covered with soft rubber. The galvanic current generated by the action of the acid vaginal secretion on the alternate copper and zinc beads, might possibly stimulate the uterus to growth and metrostaxis; but I doubt whether the soft parts would long endure the pressure of the beads at the posterior segment.

Abrasions and indentations made by lever pessaries are usually found behind the cervix and along either descending branch of the pubic arch. In the latter spot the injury is generally a longitudinal sulcus cut by the slender side-bar of the pessary.

c. *Lateral Displacements.*

Lateral displacements are but little benefited by vaginal pessaries. Some ingenious gynecologists have endeavored to lift up the latero-verted or -flexed fundus by elevating the corresponding side of an anteversion cup pessary, or the bar of a retroversion pessary, but their efforts have not been very successful. The only supporter which really draws the displaced cervix back and pushes the latero-verted fundus up toward the median line is one which gains its purchase in the uterine cavity. It acts by straightening the uterus, the lower flange on which the cervix rests being of unequal width, the wider on the side toward which the cervix points. The object is thereby to push the cervix toward the median line. The origin of these lateral displacements, either in congenital shortening or cicatricial contraction (after cellulitis) of the broad ligament of the affected side, usually prevents any efforts for the relief of this condition from being successful.

d. *Prolapsus of the Ovaries.*

For prolapsus of the ovaries certain modifications of lever-pessaries have been devised, all designed to prevent the recurrence of the prolapse by stretching the posterior vaginal pouch in the antero-posterior direction

or laterally, and by relieving pressure on a prolapsed and adherent ovary. The former indication is more or less filled by Thomas' bulb-pessary with different-sized bulbs, broader, thicker; the latter, by Gehrung's retroversion pessary with central depression, or one of Thomas' bulb-pessaries similarly or unilaterally bevelled out. The usual variety of ovarian prolapse is behind the uterus in Douglas' pouch, or one of the retro-lateral pouches. The retention of a prolapsed ovary by a pessary is by no means so easy as that of the fundus uteri. The extreme mobility of the ovary renders it very liable to slip down behind the pessary, when the pain of its compression will soon herald the accident and require the removal or change of the pessary.

The utility of glycero-carbolized pledgets of cotton in retroversion and prolapsed ovaries, as a means of support when hard pessaries are not borne, has been sufficiently pointed out under Tampons, as also the benefit to be derived from a firmly packed column of cotton in displacements with parametran infiltrations and hyperemic conditions of the uterus and adnexa.

By packing the anterior vaginal pouch thoroughly full of glycero-carbolated cotton pledgets, the cervix may be crowded against the posterior vaginal wall and the uterus retained in anteversion. If the fundus shows a tendency to retrovert in spite of this, the posterior cul-de-sac may also be filled with cotton, and the whole may be supported by a column. These tampons should be changed every day, or other day, until a permanent supporter can be worn.

e. *Pessaries for Cystocele, Rectocele, and Prolapsus Uteri.*

The best cystocele pessary, in my opinion, is Gehrung's anteversion pessary (Fig. 182). Indeed, all anteversion pessaries are, to a certain degree, useful in cystocele. An elastic ring, Fig. 208, will also answer when no hope of cure of the cystocele is entertained. The Gehrung pessary, with daily tannin pledgets between the branches, offers the best hope of cure. Rectocele is relieved by a large Hodge, or Smith, or a ring pessary. A cure is generally effected only by a plastic operation.

Vaginal pessaries for the relief of prolapsus uteri et vaginæ consist mainly in such contrivances as act by their size, and by distending the vaginal walls to their utmost. These instruments then rest on the floor of the pelvis, and are prevented from being forced out by whatever contractility exists in the perineum and vaginal orifice. As regards curative properties, they are all worthless, except one, the largest size of Gehrung's anteversion pessary. In construction many are faulty and dangerous, unless very carefully watched. Of these latter, the old time-honored Zwanck, with wide-spread wings, is the best example; it is not yet obsolete, unfortunately. I have seen one case of vesico-vaginal fistula produced by the pressure of one of these wings. It keeps up the uterus, true, but at the expense of all hope of ultimate cure, and with danger to the patient, unless she be intelligent enough to remove it daily, and keep her vagina well cleansed. That of Noeggerath is built on the same principle, and

open to the same objections. They are introduced, closed, and expanded by a screw mechanism in the handle when in the vagina.

The large, thick ring-pessaries of Martin, Braun, and others, are made of glass, hard rubber, wood, varnished canvas, etc., and are a necessary evil in some aggravated cases of prolapsus in old, withered patients. They keep up the uterus, if retained (wherein they may be aided by a T-bandage), and that is all. In many cases, however, that is all that is expected or possible. So far as possibility of injury is concerned, the inflated soft-rubber bags of Gariel and Braun are certainly the best; they are introduced closed, and expanded with air or water, and can easily be emptied and refilled by the patient herself. They require daily removal and cleansing, being best kept overnight in a basin of carbolized water. Large glass balls have been used for the same purpose. All these instruments, it will be seen, still belong to the primeval age of the science of mechanical support in uterine displacements. They are still largely employed for want of something better.

FIG. 208.—Peaslee's Elastic Ring-pessary.

Gehrung's largest sized anteversion pessary has repeatedly, in my hands, perfectly retained a complete prolapse of uterus and vagina. Before I succeeded in having the proper Gehrung's pessary made out of Hodge's pessaries, I used the Albert Smith, simply approximating the posterior bar and the anterior beak, until the former stood exactly above the beginning of the smaller curve where it bends down toward the anterior beak; the distance between these two points was two inches. With this largest sized pessary I have retained one of the worst prolapses I ever saw, in a woman sixty years of age. She wore the pessary for months with perfect comfort, and for aught I know, is wearing it still. It kept up the anterior wall of the vagina so perfectly, that the uterus could not descend. By separating the bars at the posterior curve more than usual, the retentive power is increased. Any large Albert Smith or Hodge pessary may thus be converted into an excellent supporter for prolapsus uteri at a moment's notice.

It is scarcely necessary to say that every prolapsed uterus should be replaced before introducing the supporter. The dorsal position answers for the application of all these instruments.

More than usual care should be exercised in guarding against excoriation and ulceration while these supporters are worn; the great pressure of the uterus, which constantly endeavors to force its way down, would naturally lead to some such injury. Occasionally, a prolapsus is unintentionally cured by the cicatricial contraction of the vagina following an ulceration produced by the too long retention of one of these large pessaries. I recently saw such a case, as the result of five years' retention of a glass

ring. As the extent of such ulceration cannot, however, be limited at will, it is hardly fair to the patients to allow them to run the risk, even with a possible chance of cure.

3. Vagino-abdominal Supporters.

Supporters which are furnished with attachments to bands encircling the body are used either for retro-displacements in which a lever-pessary fails to retain or lift the fundus, or for prolapsus of the vagina and uterus, which overcome all the intravaginal instruments mentioned.

The cases of *retro-displacement* requiring an external support for the internal pessary, are those of short retro-cervical pouch, with heavy, enlarged, perhaps adherent uterus. In these it frequently happens that no mere vaginal instrument is retained or answers the purpose; the stronger

Fig. 209.—Cutter-Thomas Vaginal Stem-pessary for Retroversion.

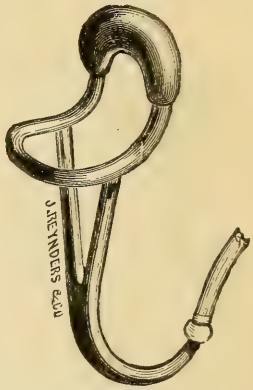


Fig. 210.—Thomas' Chair-pessary with Stem, for Retroversion and Prolapsus.

upward pressure of a pessary held in place by an abdominal belt and sacral strap is required to deepen the posterior pouch, stretch the adhesions and elevate the fundus. Pessaries of this kind are those of Cutter modified by Thomas (Figs. 209 and 210). The rubber tubing by which these pessaries are attached to the abdominal belt is designed to exert an elastic upward pressure. The peculiar curve of the pessary adapts it to the posterior vaginal wall. Occasionally these pessaries may be used to elongate the anterior vaginal pouch. In many cases in my hands these supporters also failed to push up the fundus; and, if the uterus was really adherent or very heavy, the supporter usually slipped down, so as to emerge from the vagina, or prove inert. The addition of an anterior curve and tube passing up over the pubes might make the instrument more serviceable Still, in several most intractable cases of retroflexion, in virgins and married nulliparæ and multiparæ, in whom lever-pessary after lever-pessary, of different sizes, shapes, and curves, with and without posterior bulb, failed to retain the fundus in the anteverted position to which it could easily be replaced, as a last resort I tried a Cutter pessary with thick posterior bulb, and the result was eminently successful. The patients declared themselves satisfied to endure the inconvenience of the tubes and

straps for the sake of the perfect reposition of the uterus which the apparatus afforded them. They were taught to remove the pessary at night and to reintroduce it in the morning before rising, even learning to do both in the knee-breast position, thus giving the uterus no opportunity to retrovert before the pessary was replaced. In one case, however, with heavy uterus, slightly sinistro-retroverted and somewhat bound down by contraction of the left broad ligament, after all the retroversion pessaries had failed, the Cutter also slipped down and proved useless.

As soon as the vagina is fitted for it, an intravaginal supporter should be applied.

The number of supporters for prolapsus uteri is legion, many of them being patented and sources of income to their owners, if not of benefit to the women who buy and wear them. The principle upon which they

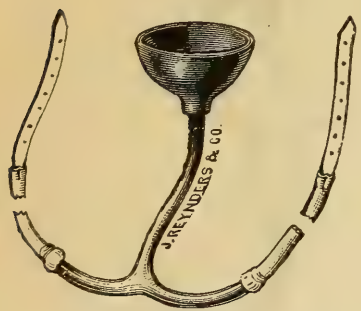


FIG. 211.—Thomas' Cup and Stem Supporter for Prolapsus (modified from Cutter).

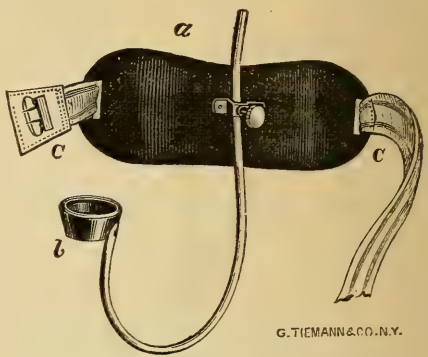


FIG. 212.—Tiemann's Supporter for Prolapsus.

all act is apparent on a glance at Figs. 211 and 212; and so also are their defects. A small cup, ring, or olive is designed to fit directly over the cervix and hold up uterus and vagina. The former often succeeds, but the latter as often fails because the flabby, redundant vaginal walls force their way down beside the central supporter, and are bruised and excoriated between it and the pelvic wall. It may be assumed as a fact that all such supporters which actually retain a prolapsed uterus and vagina of the third degree, do so by exerting a pressure on whatever point they happen to touch, which is sure, sooner or later, to produce an ulceration, the discovery of which demands the removal of the supporter until the injury is healed. Besides, the immovable stems which it is unavoidable to give these instruments in order that they may possess sufficient resisting power to retain the uterus, generally are the cause of considerable pain to the patient, each movement forcing the tender uterus down on the immovable support. To obviate this, the stems were made of elastic steel springs, or of rubber tubing; or a spiral wire spring was inserted into the stem. But the elasticity of the stem was either too great (and then the uterus came down) or too little (and the pain was the same); or the constant oscillation of the spiral spring produced nervous symptoms similar to those following masturbation, as I saw in one case.

A case illustrating the dangers attending the use of these supporters is reported by Dr. J. Steele Bailey, of Stanford, Ky., in the *American Practitioner* for June, 1882. A Tiemann supporter (Fig. 212) was applied in a case of complete prolapsus uteri et vaginæ and did perfectly well for a week ; then, while churning, an accidental strain forced the uterus through the cup of the supporter, where it was tightly strangulated. Only after repeated strenuous efforts at reduction was it possible to release the uterus by sawing through the hard-rubber cup. The uterus protruded to the length of seven inches below the cup and, after nearly forty-eight hours' imprisonment, was almost gangrenous. The woman eventually recovered.

Besides, the expense of these contrivances (in this country, at least) renders them beyond the means of the very women who need such supporters most, the hard-working women of the laboring classes. A poor woman who has to do washing and ironing, or scrubbing, or carry a pail of water up three or four flights of stairs, and who is not able to rest herself after confinement, soon acquires a prolapsed uterus, and cannot afford to spend five or six dollars for a complicated supporter, which is easily spoiled and which, after a few days, may prove useless. The ideal pessary for complete prolapsus uteri is yet undiscovered. I really do not know of a cheaper, more efficient and, for its possible curative properties, more desirable supporter for these cases than the large tampon of cotton soaked in glycerole of alum or tannin and introduced every day by the woman herself and retained by a T-bandage. I have already described this supporter under Tamponade of the Vagina.

Dangers.

The *dangers* from vaginal pessaries may be gathered in part from the remarks attached to each variety. Complicated and hinged pessaries are far more likely to cut into the vaginal wall, produce offensive discharge and excoriation than simple hard-rubber rings. The same is true of soft pessaries as regards the discharge. The longer a pessary is left in the vagina uncleansed, the more it will be incrusted with calcareous deposits, and the more irritating will it become. Cases have been observed in which a Zwanck pessary perforated the bladder, and instances of injury of the rectum, and of Douglas' pouch have been reported. These accidents were mostly produced by the clumsy old pessaries, which were wanting in all mechanical principle and acted only by their bulk. But cases of ulceration of the vaginal wall from Thomas' cup, Hodge's and Smith's lever pessary, are occasionally met with. I have seen one instance of a localized cellulitis near the left descending ramus of the pubic arch from a too large Hodge, and one case in which one of the hinges of a well-fitting Thomas cup-pessary, which had been left in the vagina for five months, contrary to particular directions, had perforated the recto-vaginal wall. The minute fistula only admitted a fine anatomical probe, and healed without treatment in a week after removal of the pessary. With due attention to a proper choice of pessary, to cleanliness and with occasional supervision, such accidents should not and will but rarely occur. I have met with sev-

eral cases in which a retroversion lever-pessary, which apparently was a perfect fit and gave no inconvenience whatever for a number of weeks, suddenly caused pain, and on examination, was found to have completely turned in the vagina, so that the retro-uterine curve pressed into the rectum, and in one case the pessary had shifted completely around, the posterior end being under the symphysis. I strongly suspect that coition had something to do with these vagaries, although I can readily imagine how constipation and a solid fecal evacuation might thus displace a pessary. Worse results than here cited are not reported to have followed, except one case of myelitis supposed to have followed a pessary, cited by Verneuil; and Hegar and Chrobak each noticed cancerous infiltration at a spot where the pressure of a pessary had produced granulations. Such cases are certainly rare exceptions, and cannot weigh as counter-indications to the use of pessaries.

Curability of Uterine Displacements.

The CURATIVE *results* from pessaries are not as encouraging as we could wish them to be. If applied at an early stage of the displacement, and especially at a time when the natural involution of the pelvic organs—uterus, ligaments, and cellular tissue—favors a *restitutio ad integrum*, pessaries may, after a certain time, several months or more, produce an entire cure of the displacement. This is particularly true of retroversions, prolapsus, rectocele, and cystocele. Later on it is the exception to find the relaxed ligaments restored to their normal tone and tension. Still, I have seen within a year an old retroversion changed almost to an anteversion by a five months' use of an Albert Smith pessary; and another retroverted uterus replaced permanently (at least up to the present time, four months) by only a two months' use of the same instrument, and we should not despair of a perfect recovery if we do not neglect other local means (astringents, hot or cold injections) and general tonics to strengthen the system.

While the puerperal state is a particularly favorable time to act upon the displaced uterus (and I have introduced a retroversion pessary as early as the eighth day after delivery), we must not expect too great results even then. An inveterate retroversion or retroflexion may be benefited for a while until the patient rises and walks about, when usually the flabby uterus flexes over the posterior bar of the pessary and this opportunity for cure is lost. Only rest in bed, until subinvolution has been entirely completed, two to three months, or longer, may achieve a cure.

With this doubtful prospect as to an entire cure in the aggravated cases of each displacement, we are still obliged to resort to pessaries as the best palliative measures at hand. By perseverance and ingenuity, entire recovery will occasionally be accomplished even in these bad cases. The minor degrees are readily susceptible of cure.

Thomas states that in the treatment of no form of uterine disease has he experienced so much satisfaction and accomplished so much good for his patients, as in anterior displacements. He does not claim to have cured the displacement or distortion, however (at least he speaks only of

"giving relief," being "rewarded by success," etc.; nowhere of *cure* in that chapter of his new edition); and I cannot help thinking that a large portion of the relief experienced by the patients referred to by him was due to the very means asserted by Emmet, the elevation of the whole uterus. This, Thomas denies; but I certainly have seen no sharp flexion of long standing become straight through the use of one of his anteflexion pessaries, or those of any one else, although great relief is undoubtedly afforded which may even continue after the pessary has been removed. According to this author, greater skill is required to select and adjust pessaries for anterior displacements, and they are more readily productive of danger than retroversion pessaries. My experience has led me to a different conclusion, which I know to be shared by many prominent gynecologists. The danger of ulceration from the pressure of one of the complicated hinge instruments, above described, I admit, of course; but I have failed to observe any very great difficulty in selecting or choosing a proper pessary for an anteversion or anteflexion (at least, so far as I could judge), or in fitting it to the vagina. The same rules as to size and adaptation to the vaginal walls apply here (only, I think, in a less degree) as with retroversion pessaries. And as regards frequency of indication, I have found at least ten retroversion pessaries called for by the symptoms, to one for anterior displacement. Perhaps this is the reason why I have met with so little difficulty in choosing the latter. *To properly fit a lever-pessary in a case of acute retroflexion with short posterior vaginal pouch, or of heavy retroverted uterus of the third degree with thickened and contracted utero-rectal ligaments, or of rectocele and lacerated perineum, has always seemed to me the severest test of the ingenuity and mechanical skill of a gynecologist in this department.* In making this assertion, I do not, of course, refer to anteflexion, which I have already stated to be, in my opinion, beyond remedy by a vaginal pessary.

The results obtained in patients who are able to give themselves the best possible care are, of course, much better than can be expected in the poorer classes. Such success as reported by Dr. F. B. Watkins, of Richmond, Va. (*Virginia Medical Monthly*, November, 1875), has certainly not been my experience in a larger number of cases than those reported by him, and treated on the same principles. In 215 cases of uterine displacement (retroversion 139, anteversion 49, prolapsus 27) in which he employed mechanical supports, he achieved the following results—*Retroversion:* Complete recovery, 114; partially relieved, 9; slight or no improvement, 12. *Anteversion:* Recovery, 34; partially relieved, 9; slight or no improvement, 7. *Prolapsus:* Recovery, 22; partially relieved, 4; slight or no improvement, 2. Total: Recovery, 170; partial relief, 36; slight or no relief, 21. The vaginal supporters used were all constructed on the Hodge closed lever principle, of block-tin wire and hard rubber, accurately fitted. No vagino-abdominal supporters with fixed ends were used.

Similar successes are published by Dr. P. O'Connell, of Sioux City, Ia., in the February, 1881, number of the *Chicago Medical Journal and Examiner*. He reports eight cases of complete cure, all of retroflexion, the

pessary used being the Albert Smith lever. His observation of the patients extended over one year, the shortest, to four years, the longest period after the removal of the pessary, and in no case did the displacement return.

My experience during the past few years (collated for a paper on the Curability of Uterine Displacements, which I read before the International Medical Congress in London, in August, 1881), gives me the following figures: Out of 2,500 patients with uterine diseases, I find 895 instances of displacement or distortion of the uterus of one variety or the other. Of these, 827 patients were married and 68 single; 624 had had one or more children. Of the single women, only 5 had a simple retroversion, and 3 a retroversion of the anteflexed uterus. All the other single women had anteflexion and anteversion, with a few instances of latero-version and latero-flexion. Among the married nulliparæ, only 15 had retro-displacements. The most common displacement was retroversion, of which there were 348 cases, as compared with 55 of retroflexion. There were 295 cases of anteflexion, 102 of anteversion, 10 of latero-flexion, 10 of latero-version, 5 ante-latero-flexion, 3 retro-latero-flexion, 1 anteversion with latero flexion, 23 anteflexion with retroversion, 21 descensus with retro-version, 13 total prolapsus uteri et vaginæ. In 8 cases the retroverted uterus was firmly bound down by adhesions. In this classification many cases were found in which both flexion and version existed; the predominating condition was chosen to designate the case.

Of these 895 cases of displacement, 184 were treated by vaginal and uterine pessaries. Thus, of the 403 cases of posterior displacement, 96 retroversions and 31 retroflexions were treated by vaginal pessaries, the retroversions chiefly by the Albert Smith modification of the Hodge lever, occasionally by the original Hodge or Noeggerath's cradle-pessary; the retroflexions by my modification of Thomas' bulb retroflexion pessary. A few cases in which no lever-pessary could be made to fit were relieved by a Peaslee flexible ring, which simply lifted up the whole uterus, and by a Cutter's stem with bulb, which succeeded in retaining the organ after all other pessaries had failed. Only in three cases was it necessary to prevent the constant retroflexion of the uterus over the posterior bar of a lever-pessary by inserting a hard-rubber stem; an ordinary Albert Smith then retained the uterus perfectly.

Of the 407 cases of anterior displacements (295 anteflexions, 112 anteversions), only 40 were treated with vaginal pessaries (28 anteflexions, 12 anteversions), and 16 with intra-uterine stems (5 anteflexions, 11 anteflexions with retroversion). The reason why supporters were thought necessary or beneficial only in 56 cases out of 407 of anterior displacement, as compared with 127 out of 403 cases of retro-displacement is, that the symptoms produced by the anterior displacements were so much less acute than those of the posterior dislocations, and consisted chiefly of dysmenorrhea and sterility, that a supporter was indicated only in the aggravated forms and the flexions were treated and benefited generally by repeated active dilatation by divergent steel dilators. If the dysmenorrhea was relieved (as was almost always the case) by dilatation, but the flexion

still continued (as it usually did), and if the patient was married and sterile, a pessary was inserted and worn for some months. The stems were used only when the uterus was so flabby as to double over the anterior border of the pessary, or, in anteflexion with retroversion, when it was impossible to secure sufficient purchase on the posterior surface of the uterus, owing to the shallowness of the posterior vaginal pouch and the rigidity of the supports, to elevate the fundus with a lever-pessary ; in these cases, the stem enabled me to antevert the uterus and retain it thus by a lever-pessary with unfailing certainty. Five of these patients wore their stem and Smith pessary for eleven, five, three, and two months (two cases), respectively, attending to all their marital and household duties ; when the stem was removed at the expiration of the periods named, the uterus was found fairly straight, and was left sustained by the lever-pessary in order to give an opportunity for conception. In none of these cases, however, has such a result been as yet reported.

The pessaries used for anterior displacements were : For flexions, Thomas' cup-and-hinge pessary (modified by me by sinking the originally projecting hinge so as to prevent its indenting the vagina) ; for versions, Gehrung's double-horseshoe pessary, and Thomas' open cup-and-hinge pessary, principally the latter. The length of time during which these pessaries were worn varied from a few weeks to many months and several years. In one case the Albert Smith pessary was worn for one year and a half without interruption (against my direction), with the result of producing a deep ulcer behind the cervix. In two instances of anteflexion a slightly curved hard-rubber stem-pessary was worn for eighteen months, with the result of leaving the uterus fairly straight, but in neither case has conception occurred after a lapse of two years.

In five cases of anteflexion, conception followed repeated rapid dilatation and during the wearing of a cup-pessary (I am inclined to attribute the conception more to the dilatation than to the pessary) ; and in nineteen cases of retroversion the patients became pregnant while wearing a lever-pessary. In one instance conception occurred at the very next period after the sharply retroflexed uterus and the prolapsed ovaries were elevated and retained by my bulb-pessary ; and pregnancy went on to term. I did not attend the lady afterward and hence do not know whether the displacement returned. In only four of the cases of retroversion was it possible for me to see the patient during and soon after confinement (they both being under my obstetric care), and in all the uterus was supported by a lever-pessary during the second week before they were allowed to rise ; in two of these patients the continued wearing of the pessary for six months longer resulted in a complete cure ; in the other two it is still being worn. The anteflexion cases did not return for subsequent treatment, as they would have done had they been sterile again after the first delivery, and I therefore infer that practically (not actually) their distortion was cured.

How many of these one hundred and eighty-four cases of uterine displacement treated by supports of one kind or the other were *permanently*

CURED I am unable to say, for probably the same reason that has prevented other observers from collecting positive data, viz., because patients who find themselves benefited by a supporter, go on wearing it for a while, finally remove it themselves, and finding their relief to continue without the pessary, do not return, and are thus lost sight of. That they do not return is no proof, however, that their displacement was *cured*. It was temporarily relieved, the symptoms it produced gradually disappeared, and then the pessary could be dispensed with. That such cases were not cured is sufficiently proved by the constant return of the patients months or years after the pessary had been removed by themselves or the physician, with a return of the old symptoms, and on examination the same old displacement is found. It had persisted during the interval, but its symptoms had been temporarily relieved. This holds true particularly of posterior displacements.

Thus, recently a young lady came to me for treatment for dysmenorrhea, sacralgia, and suprapubic pain. I found a sharp retroflexion of the uterus, probably of congenital origin, which resisted all gentle efforts at complete reposition. I gradually replaced it with a series of differently curved lever-pessaries, and then, after she had worn the last pessary for about two months, removed it, as she expected soon to return to her home in the West, the uterus being perfectly normal. She came to see me again about two weeks later, and the uterus was then even anteflexed; she was too well cured, it seemed. Still she was told to come again in two weeks, but remained away two months, when a return of her old symptoms brought her to me again, and I found the original retroflexion. Without this last examination, I should have pronounced her cured of her displacement. I can find but two cases of positive cure, as demonstrated by occasional examination, of sharp retroflexion; five of retroversion, including the two treated immediately after delivery; three of anteflexion with retroversion, treated by the intra-uterine stem and Albert Smith pessary; and one of sharp anteflexion, treated by dilatation with laminaria, steel dilators, and hard rubber stem during six months.

I do not deny that other cases *may* have been cured, but I am as little able to make a positive statement on this matter as the authors (Emmet, Thomas, Barnes, Schroeder, etc.) who have expressed themselves positively on this subject. Had all my cases been private patients, instead of a certain proportion in the out-door clinic of a hospital (than which class of patients I need hardly say there is nothing more uncertain and unsatisfactory so far as therapeutic results are concerned), I might have a better showing.

Löhlein, of Berlin, former assistant to Professor Martin, in an article published in 1882, arrived at substantially the same conclusions as I did in 1881, and I have seen no reason to change my convictions since then.

RÉSUMÉ OF RULES.

A brief recapitulation of the rules governing the introduction and supervision of vaginal pessaries (including vagino-abdominal) may facilitate the remembrance of the directions given in the preceding pages.

1. Always be sure of the diagnosis of the nature and degree of displacement before resorting to a pessary.

2. Always replace the uterus before applying a pessary. This applies particularly to retro-displacements. It is well to replace the uterus repeatedly, every day or twice daily, for several days before introducing a pessary. The replaced organ may be supported by cotton tampons in the interval, if it is desired to distend and toughen the vaginal pouch; or the object of relaxing the abnormally stretched uterine ligaments may have been obtained by the mere repeated replacement. In flexions, chiefly anteflexions, the frequent straightening of the uterus, or conversion into the opposite flexion by the sound, will often prove beneficial before introducing a pessary.

3. Never insert a pessary when there is evidence, by the touch, of acute or recent inflammation of the uterus or adnexa, or when pressure by the finger on the parametrium (where the pessary is to rest) gives decided pain.

4. When the uterus is not replaceable, that is, when adhesions bind the fundus down, use great caution and discrimination in deciding whether an attempt should be made and is justified by the symptoms, to elevate the fundus by manual or instrumental means, or whether the elevation should first be tried by the gradual pressure of a pessary (this applies only to retro- and latero-versions). If neither is to be recommended, do not introduce a pessary until local alterative and absorbent measures (iodine tamponade, hot injections, etc.), have effected a resolution of the adhesions.

5. Always choose an indestructible instrument, if possible.

This does not apply to prolapsus uteri.

6. Always measure and estimate the vagina carefully before choosing a pessary, and be careful to adjust the pessary in every particular (size, curve, width) to that particular case. No two vaginæ are exactly alike.

7. If the vaginal pouch is not sufficiently deep to accommodate a pessary (anterior pouch, for ante-displacements, posterior pouch for retro-displacements), defer the attempt to fit a pessary until the pouch has been deepened by daily tamponing with cotton, or by the upward pressure of a Cutter or Thomas vagino-abdominal supporter. Or the pouch may be gradually deepened by using first a small (slightly curved, in retro-displacement) instrument, and gradually increasing its size (or curve) until the desired size and shape for permanency is reached.

8. Never leave a pessary in the vagina which puts the vaginal walls to the stretch, and which does not permit the passage of the finger between it and the wall of the vagina. This does not apply to prolapsus uteri.

9. A vaginal pessary, which projects from the vulva, is displaced.

10. A pessary which gives pain must be at once replaced by one which is painless.

11. A well-fitting, properly chosen pessary should not only give no pain, but should be a direct source of comfort to the patient.

12. Always examine the patient on her feet after introducing a pessary, or when it is desired, at her return, to ascertain its efficiency in sustaining the uterus during walking and exertion.

13. Always tell the patient that she has a pessary in her vagina, or she may not return, in spite of your directions, and the pessary may remain for years to her ultimate great discomfort and danger.

14. Always tell the patient to return within a week after the first introduction, in order that the position and working of the pessary may be looked after, and that, if it does not suit, it can be removed and a better one inserted. Tell her that several trials and various instruments may be required before one is found which she can wear permanently. Also let her return for inspection once every four to eight weeks, as the case may require. Tell her that if she fails to do so the pessary may cause ulceration, for which treatment will be needed.

15. Tell the patient that she will need to wear the pessary for months, perhaps years, before a recovery can be expected.

16. Never introduce a pessary which the patient cannot remove herself.

17. Tell the patient to remove the pessary herself, if it gives pain, and show her how to do so. When she has removed it, let her present herself at once for examination.

18. Tell the patient to use daily vaginal injections for cleansing purposes. If she notices profuse discharge, add astringents ; if the discharge is sanious or purulent, let her come at once, as the pessary probably has caused abrasion.

19. Tell her, on removing a pessary to test the result, that the permanence of the benefit obtained therefrom cannot be determined for several days or weeks.

20. Always direct your patients to relieve all superincumbent pressure on the pessary by a proper support of their skirts ; and if the displacement be anterior, aid the internal supporter by an abdominal (suprapubic) pad.

All pessaries may be introduced in the knee-chest position when it is desirable or possible to replace the uterus only in that position. A Sims speculum elevates the perineum, the air enters and expands the vagina, and the pessary (chiefly in retroversion and prolapsus) is introduced by touch and sight, and the patient laid on her left side. For aggravated retroversion, and for prolapsus of ovaries or uterus, this position offers many advantages over the left semiprone decubitus. Care must be taken to remember that the position of the patient is reversed, and that the pessary must be introduced accordingly.

4. Intra-uterine (Stem) Pessaries.

Intra-uterine pessaries consist of straight or slightly curved stems of various lengths and diameters, which are introduced into the uterine cavity in order to maintain its straight direction. They are composed of some solid substance (metal, wood, ivory, glass, hard rubber) or of soft, flexible material (soft rubber, bougie, catheter), or they are complicated, consisting of links of metal (copper and zinc), or of divergent springs to insure their retention in the uterus.

The solid stems are smooth, slender, round rods, two and one-eighth inches in length (they are usually one-eighth to one-fourth of an inch longer in the shops, which is *too* long), mounted on a disk, or cup, or bulb, which rests against the cervix and prevents the stem from being pushed farther into the uterine canal. The best are those made of hard rubber. Dr. Noeggerath prefers lead. The sizes vary from that of a No. 10 to No. 14 bougie, American scale, or even larger. The tip is rounded and smooth.

Fig. 213.—Hard-rubber Stem-pessary.

Fig. 214.—Thomas' Galvanic Stem-pessary.

The soft stems are made of soft rubber, in very much the same shape, or of a bougie or elastic catheter, and can be cut to any size desired. The complicated stems, those which diverge, are those of Peaslee and Chambers with steel springs, that of Coxeter, of soft rubber, that of Thomas, alternate copper and zinc beads on a flexible metal stem, and numerous others.

There are, besides, a number of still more complicated contrivances designed also to insure retention of the stem by connecting it with a vaginal supporter; such are those of Kinloch (Fig. 215), Byrne (Fig. 216), Thomas (Fig. 217), Studley, and Conant.

These combination stem and vaginal pessaries are generally designed for retroflexion, but answer equally well for any case where the stem is not retained in utero. That of Conant is, perhaps, the only contrivance of any service in correcting a lateral displacement. Unfortunately, the frequent production of this displacement by inflammatory contraction of one broad ligament to a great extent invalidates the utility of an instrument, the *point d'appui* of which is the uterine cavity. One vaginal wing may be made larger than the other when it is desired to press the displaced cervix toward the other side. Noeggerath has variously modified this instrument.

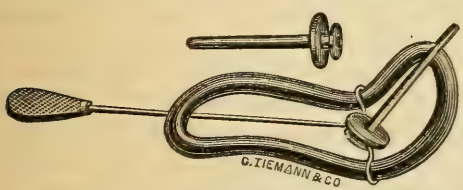


Fig. 215.—Kinloch's Stem-pessary for Retroflexion, with Staff for Introducing Stem.

The best stems are the smooth straight ones, and the best straight stems are those of hard rubber. Stems with metal divergent springs are dangerous, and should not be used. The soft-rubber inflatable stems are less injurious, but easily become foul. Thomas' galvanic stem-pessary is used solely for its stimulating effect in uterine atrophy and amenorrhea. I have had excellent results with it, when I could secure its retention. It is so slender as to escape from most uteri, but may be fixed by cotton wads or a cup-pessary.

Of the utero-vaginal combinations, those with movable connections of soft rubber, like Kinloch's and Studley's, are certainly safer than the im-

movable hard-rubber bar of Byrne. However, this immobility of the connection between stem- and lever-pessary is precisely the advantage claimed by Byrne for his instrument.

The *indications* for the use of straight stems introduced into the uterine cavity, and retained there for a greater or lesser time, are the existence

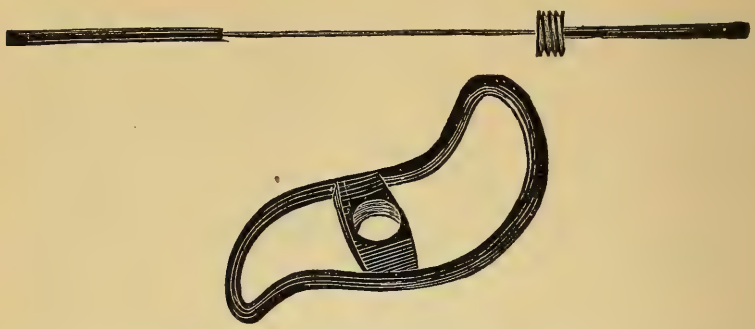


FIG. 216.—Byrne's Stem-pessary Mounted on Staff for Introduction. Byrne's Vaginal Pessary with Sliding Crossbar into which the Stem is Screwed.

of some distortion of the canal, which is irremediable by simple vaginal supporters. Such distortions (in contradistinction to displacements, viz., versions) are the flexions, ante-, retro-, and latero-, chiefly those of congenital origin, the ante- and latero-flexions. I have already stated that chronic displacements of the uterus are only exceptionally *cured* by vaginal supporters; this is true to a still greater degree of the distortions. The cure of a chronic anteflexion by a vaginal pessary is probably still to be reported. With retroflexions the chances are better, for the uterus may at least be straightened, and the flexion converted into a version, which I have shown to be readily remedied and sustained by a pessary. This inability to straighten a sharply flexed uterus by a vaginal support was recognized by the earliest advocates of pessaries, and led to the construction by Möller, in 1803, of a stem composed of an elastic catheter with flexible wire stylet, which could be bent to any desired curve. Amussat followed, in 1826, with a smooth ivory stem, and twenty years later Simpson, Valleix, and Kiwisch almost simultaneously introduced intra-uterine stems. Since then, the controversy as to the utility, safety, and, indeed, the justifiableness of intra-uterine supports under any circumstances has been waged with a vigor and a diversity of opinion seldom met with even in the realm of medical science.

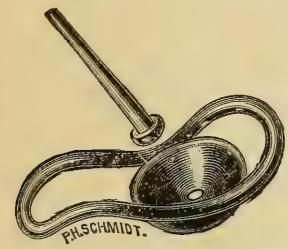


FIG. 217.—Thomas' Cup Lever Pessary, for Supporting Intra-uterine Stem.

While some gynecologists claim to have achieved numerous cures with intra-uterine stems, without the slightest injury, others again decry them as an "invention of the devil," as utterly unjustifiable, and entirely useless.

Both parties contain names of the highest eminence, living and dead. In order to give the reader an opportunity of judging of the evidence on both sides, I will reproduce the following list of authorities from Chrobak:

Pro.—Amussat, Simpson, Lee, Valleix, Gaussail, Velpeau, Kiwisch, C. Mayer, Detschy, E. Martin, Veit, Olshausen, Hildebrandt, Haartmann, Winckel, Schröder, Lewis, Hennig, Kristeller, Graily Hewitt, Priestley, Savage, Greenhalgh, Beatty, Courty, Weber, Grenser, Benicke, Beigel, Bantock, Chambers, Rigby, Atthill, Routh, etc. To these may be added, Van de Warker, Eklund, Noeggerath, Goodell, Chadwick.

Contra.—Depaul, Raciborsky, Piorry, Gibert, Amussat (later), Cazeaux, Scanzoni, Hueter, Hohl, C. Braun, Seyfert, Credé, Freund, Spiegelberg, Spaeth, Habit, Retzius, Tilt, Meadows, Oldham, Bennett, West, Duncan, Tait; besides, Skene, Byford, Barker, Emmet.

A middle position is occupied by Schultze, Peaslee, Hegar and Kaltenback, G. Braun, Albert H. Smith, Chrobak, Thomas, Byrne, Kinloch, Studley. These latter gentlemen do not wholly discard the stem, but permit its use in certain cases in which vaginal supporters have utterly failed to rectify the distortion, and the gravity of the symptoms warrants the use of a remedy which *may* produce the most serious results.[1] Such cases are either aggravated anteflexions, with dysmenorrhea and sterility (whether such flexions are congenital or not is still a mooted question); retroflexions, in which the flabbiness of the uterus prevents a lever-pessary from straightening the organ (the retort-shaped uterus); retroversion of the anteflexed uterus, in which the posterior vaginal pouch is so short and the cervix so sharply curled up anteriorly as to afford no purchase for a lever-pessary; lateral displacement not depending upon cellulitis; finally, amenorrhea from atrophy or deficient development of the uterus.

To specify in detail the exact conditions in which the risk attending the use of a stem is justified, is scarcely possible. An exclusion of all counter-indicating circumstances, the failure of previous measures for rectifying the distortion, chief among which measures are, of course, vaginal pessaries, and the necessity of relieving the patient, must formulate the indication to the mind of each practitioner.

The justifiableness of inserting a stem simply for sterility probably produced by anteflexion will be governed by the same rules as those for other no less dangerous measures—the dilatation of the internal os by tents, dilators, and the knife. It is allowable to let the patient run a certain amount of risk in order to gratify her desire for maternity, but she should be made acquainted with the risks, and from her should come the decision.

Counter-indications and Dangers.—All inflammatory conditions of the uterus or adnexa, whether acute or chronic (except perhaps *very* old adhe-

[1] My distribution of the additional names depends on the opinions expressed by their possessors during the elaborate discussion of Dr. Van de Warker's paper on the "Intra-uterine Stem," at the meeting of the American Gynecological Society in Boston, in June, 1877 (Gyn. Trans., vol. ii), and on their written or expressed opinions found in recent literature.

sions), immobility of the uterus, extreme tenderness of uterus and adnexa, endometritis; uterine hemorrhage, pregnancy—absolutely counter-indicate intra-uterine stems.

The *dangers* are: production of peritonitis or cellulitis, hemorrhage, shock, perforation of fundus (Pallen), any of which accidents may be followed by death.

The advocates of stem-pessaries claim that with due care their use is no more dangerous than that of any other proportionate surgical treatment of the uterus, and admit a ratio of accidents of one or two per cent. An occasional death is reported, but so has division of the cervix, or dilatation with sponge-tent been followed by death. The frequent serious accidents and deaths formerly reported (Hueter, in 1870, collected twenty-three deaths) were doubtless due to carelessness in the selection of the cases, poor instruments, and defective supervision. Noeggerath reports 1 case of hematocele, 1 of acute mania in a hysterical woman, and 1 death from peritonitis in over 100 cases; Winckel found no death among 247 cases, and Van de Warker collected 393 cases with but 13 serious accidents. I have seen one case of pelvic cellulitis and one of pelvic peritonitis, both terminating in recovery, from the protracted wearing of a jointed Greenhalgh, copper and zinc beads, and a smooth hard-rubber stem, against positive directions to remove the stem by the attached strings as soon as pain was felt. On the other hand, numerous reports are made of cases where the stems have been worn for months, and even a year, without the slightest evil consequences. I removed a smooth, hard-rubber stem several years ago from a patient with sterility from retroversion of the anteflexed uterus, who had worn it and a lever-pessary for over five months without the slightest disturbance or interference with her menstrual or marital functions. It was removed simply in order to test the position of the uterus and her capability of conception. Recently I removed slightly curved hard-rubber stems from two ladies who had worn them uninterruptedly since their introduction, respectively eighteen and twenty months before in Germany. The stems were inserted for dysmenorrhœa and sterility, the former of which was relieved, and were removed to test the permanency of the benefit and the possible influence on the sterility. In one recent case of obstinate retroflexion, the stem was worn for over four months, and then, for some unknown reason, gave pain; the patient continuing to wear it, contrary to positive direction; a large plastic exudation of cellulitic and peritonitic nature took place, after the absorption of which the uterus was found bound down by adhesions. At the earnest solicitation of the patient, who was made fully aware of the risk, some six months after the exudation had disappeared, the uterus was forcibly elevated under chloroform, a lever-pessary was first introduced, and no reaction ensuing, a week later a hard-rubber stem, both of which have now been worn without discomfort for nearly a year.

While there are certain cases in which nothing will do as much good as a stem-pessary, and nothing will straighten the canal but a stem, and in which we are therefore justified in using it, we should always carefully

weigh the benefits and risks before deciding to insert it, and remember that, however tolerant the endometrium may be of momentary insults, it occasionally resists, with great violence any permanent irritation. And even the smoothest stem will prove an irritant to many uteri.

The question may be summed up by saying that, while certain cases will react disagreeably against the introduction or retention of a stem-pessary, the majority will bear it well, if the proper precautions (to be enumerated hereafter) are observed.

Chrobak puts the question very fairly as follows: "Not having, in the relatively small number of cases in which I employed the intra-uterine stem (35), seen markedly better results than from other measures, I have gradually restricted its use, although I must admit that I do not consider the stem-pessary, with proper caution, a specially dangerous instrument, and permit its use when all other treatment has failed and the severity of the symptoms justifies a treatment not quite free from danger." Personally, I am convinced that the stem could be used with great advantage in very many cases, chiefly aggravated anteflexion, if it were always introduced at the home of the patient, under anesthesia, and the patient kept in bed for at least a week after.

The *precautions* to be scrupulously observed in the use of stem-pessaries are the following: 1. Carefully exclude all counter-indicating circumstances. 2. Always choose a stem which is at least one-fourth inch shorter than the uterine cavity, the exact length of which should have been measured by sound or probe. The majority of stems sold in the stores are at least one-fourth of an inch too long, and consequently press upon the fundus. If a shorter stem had been used, the accident reported by Dr. Pallen of perforation of the fundus through the stem being driven into it by a sudden fall, could not have occurred. 3. Use only a smooth instrument, without springs. The soft-rubber stems of Coxeter, Squarey, and others, are exceptions to this rule, as also the galvanic stem of Thomas, which is intended to irritate. 4. Always insert the stem, if possible, at the house of the patient, under anesthesia if previous dilatation is to be employed, and keep the patient in bed for at least one week. 5. Attach a cord to the bulb of the stem and tell the patient to remove it, if she experiences the slightest suprapubic or pelvic pain, which continues longer than a few minutes. 6. Tell the patient to avoid violent exercise, lifting, sexual intercourse, until the stem has been worn at least several weeks and a tolerance has been established. 7. See her often and watch her carefully; as Goodell says, and he is an ardent advocate of the stem under the precautions here enumerated, "this instrument is a good one, a very good one—to watch."

The *results* of the treatment by intra-uterine stems have been fairly expressed by Chrobak in the above quotation. Whether old sharp flexions are ever *cured* by the prolonged straightening of the canal with a stem, is still undecided. If the stem chances to produce just sufficient irritation to thicken the angle of flexion, a cure may result, but this exact limit is difficult to obtain. We may either irritate too little or too

much. As regards sterility and dysmenorrhea, the results are better. Strange to say, conception has even taken place with a stem in utero, and the gestation has in most instances gone on to term. Winckel, Olshausen, Goodell, and others, report cases, some twelve or fifteen altogether, I believe. Of course, the stems in these cases did not possess the broad cup for the cervix shown in Fig. 213, but merely a small bulb to prevent its slipping into the os. The cure of dysmenorrhea, depending on stenosis of the uterine canal by prolonged wearing of a stem, is not uncommon. Amann reports nine cures in sixteen cases, and I have seen quite a number in my own practice.

Mode of Introduction.—The exact dimensions and curve of the uterine canal must first be ascertained by the sound; especially must the length of the canal from external os to fundus be carefully measured. A stem, corresponding in thickness and length to the canal, is then chosen. I have already expressed my preference for the smooth, hard-rubber stem, of which there are several sizes. Special care should be taken to have the stem at least one-eighth of an inch shorter than the uterine canal, measuring from the bottom of the cervical cup. A stout cord, six inches long, is tied about the base of the stem, to enable the patient herself to remove it. The stem is best introduced through Sims' speculum.

The cervix being seized by the tenaculum, the uterus is drawn down and straightened, and the stem, impaled on a sponge-tent expeller or slide-applicator, is inserted into the os and pressed upward, exactly as a laminaria or tupelo-tent would be. If the canal is sufficiently large, no difficulty is experienced in passing the stem up until the cervix rests in the cup. But, if there is an obstacle at the internal os, the steel-branched dilator may be passed through it, and the canal dilated as far as seems necessary. If there is difficulty in causing the straight stem to follow the curve of the canal, the sound may be introduced, and by its side a fine probe; the sound is then withdrawn and the stem inserted along the probe as a guide, which is then removed. In some cases I have found it impossible to force the stem through the angle of flexion through a Sims speculum, but have succeeded easily by putting the patient on her back, and manipulating the fundus uteri with the external hand until I had straightened the uterus, the stem in the cervical canal being at the same time guided and supported by the internal finger; as soon as the canal was straight the stem was pushed up and the fundus down, and its insertion at once accomplished. I have found that, under such circumstances, I could succeed better without an applicator, merely guiding the stem into the cervix with my fingers, and manipulating the uterus between both hands. As soon as the stem has reached the fundus, it is slid off from the applicator, and the speculum removed. Care must be taken to allow the cord to project slightly from the vagina. The cup or bulb should always fit tightly over the os. If the stem is introduced for anteflexion, no support is needed to prevent its escape; the cervix will rest against the posterior vaginal wall, and I have never seen a stem escape when the uterus was anteverted. If it shows a tendency to retrovert,

however, some support must be given to the bulb of the stem, and this may be done either by a lever-pessary with a cup between its bars (Fig. 217) or by attaching the stem to a lever-pessary by a rubber band (Fig. 215), or by fixing it in a movable hard-rubber slide (Fig. 216). Supports which are immovably connected with the stem are, in my opinion, more dangerous than those in which an elastic rubber band or hinge permits the uterus to move about with every motion of the diaphragm. The stem may either be inserted first and the vaginal pessary second, which is best done through a Sims speculum, or the lever-pessary is first introduced as above described, and then the stem through the speculum. The difficulty of bringing the retro-displaced cervix properly into reach, renders the latter method less desirable. I have frequently introduced both stem- and lever-pessary without a speculum, taking care not to dislodge the cup or bulb of the stem while slipping the lever into the posterior vaginal pouch. As a rule, I have found it unnecessary to connect the stem- with the lever-pessary at all, since, if the latter did its work well and anteverted the uterus, the posterior vaginal wall retained the stem by itself. I have had both pessaries worn, without being connected, for months, and neither became displaced. In retroversion of the anteflexed uterus, this combination of stem- and lever-pessary is the most satisfactory method of lifting up the fundus and straightening the uterus. Some gynecologists (Schroeder and Amann) keep the uterus anteverted for a few days by packing the anterior vaginal vault with cotton.

The introduction of a stem-pessary should be as carefully performed as that of the sound. Only a size which will readily pass should be chosen.

To remove a stem it is only necessary to hook the point of the index-finger into the cup, or press it gently from side to side until it becomes loosened, and then gently withdraw it. An oozing of bloody mucus may follow its removal. Until the patient has become used to the stem, it should be removed before each menstrual period, and reintroduced after the flow. Later on, it is not necessary to remove it. In the beginning the flow will probably be somewhat increased, but only a very decided increase will in itself demand the removal of the stem. The straightening of the uterine canal during menstruation often causes the stem to slip out of the uterus. Coition should be prohibited until tolerance to the stem is assured. It is obvious how impetuous coition might injure the fundus uteri, and gentleness is therefore imperative at all times.

How long a stem may need to be worn can scarcely be determined beforehand. The answer might be, as long as the patient can bear it. We can confidently expect to find no permanent improvement before six months, probably not before one year. And it has already been stated how improbable it is that the patient will be able to wear the stem so long. Usually, in outdoor patients, before many months have passed, some indiscretion, some exertion, or accidental circumstance, will have brought about pelvic pain or peritoneal irritation or ovarian congestion (most commonly) and the stem is removed, because the physician very wisely declines to take the risk of increasing these possibly premonitory

signs of evil. Uterine catarrh is one of the common results of long-continued wearing of a stem-pessary.

Several rules should always be observed, and they are to keep watch of the patient, see her frequently, and from time to time remove the stem only to reintroduce it at once, if all is right (as shown by bimanual examination) ; tell her to avoid unusual exertion, and to remove it at once by the attached string (which should be left until the first menstrual period is passed, at least, when it will have become offensive) if she experiences abdominal pain, or if profuse hemorrhage comes on. A disregard of this direction will probably result in inflammation, as occurred to the patients of mine already referred to.

XIII. THE HYPODERMIC INJECTION OF ERGOT.

Ergot has been injected under the skin for uterine hemorrhage postpartum and for fibroid tumors many thousand times since Hildebrandt first published his experience with this treatment in 1874. To give a numerical account of all the cases thus treated, with the results of successes and failures would be impossible, because a large portion of the cases have never been reported. The beneficial influence of ergot injected under the skin in subduing uterine hemorrhage depending on interstitial and submucous fibroids, on subinvolution and hyperplasia of the uterus, has been acknowledged beyond dispute, as also the failure of this treatment in many cases when the fibroid was subperitoneal, or exceedingly dense, or surrounded by a very thin shell of muscular tissue, or when the uterus was in the stage of induration.

In subinvolution and areolar hyperplasia this method has not become as popular as for fibroids, and still it seems, from observations made by so competent and reliable an observer as Leopold, of Dresden, that much good can be done by a systematic course of ergot-injection in these obstinate cases. This author treated eight cases of uterine subinvolution, five of hyperplasia, and one of membranous dysmenorrhea, with hypodermics of ergot, and found decided benefit as regards diminution of menorrhagia and reduction in size of the uterus, and in the dysmenorrhea case a temporary cessation and permanent decrease in quantity of the exfoliation from the treatment. In subinvolution and hyperplasia, the treatment lasted from three weeks to fourteen months, the average being about three months, and from ten to one hundred and four injections were made, the average being about forty to each patient. Only once did the puncture produce an abscess. When fifty to sixty injections had been given without special benefit, Leopold found that a continuance was not likely to be of particular use. Whatever result was to be expected was surely obtained, wholly or in part, by that time. Leopold agrees with the results of Hildebrandt as regards the effects of this treatment for fibroids, having in twelve cases, with an average of sixty injections, obtained a decided improvement in seventy-five per cent., and no benefit only in twenty-five per

cent. Hildebrandt's figures were twenty per cent. cured, sixty-four per cent. improved, and sixteen per cent. not benefited. The results of Scanzoni and Chrobak are not so good, being but forty-five per cent. improved, and fifty-five per cent. not benefited, none entirely cured. A. Martin, of Berlin, even has the discouraging figures of one hundred not benefited. Enough, however, has already been written on this subject by various authors to show that the hemorrhage in fibroids (interstitial and submucous only) can be at times greatly reduced and the size of the growth diminished by a persistent employment of this treatment. And that some benefit is to be expected in subinvolution and hyperplasia (so long as the stage of induration is not reached) is shown by the observations of Leopold.

Manner of Performing the Injection.—The two great objections to this treatment are, 1, the pain which the injections give ; and 2, the cellular inflammation, and possibly suppuration, which frequently follow at the seat of puncture.

To avoid these unpleasant symptoms several precautions should be observed :

1. A perfectly fresh solution of ergot. I have always used (and believe it to be as good as any other more complicated one) a solution of Squibb's semi-solid aqueous extract of ergot, one grain to two minims of water, with the addition of one grain of salicylic acid to the drachm of solution if it is to be kept. Every two minims of this solution thus contain one grain of ergot, and if twenty minims are injected the patient gets ten grains of ergot (equal to the same amount of the so-called ergotine) at each injection—quite as much as should be given at one sitting, if the injections are to be frequently repeated. This solution will readily flow through the ordinary hypodermic needle.

2. The injections should be made in a radius about the umbilicus, extending not more than six inches from that point as a centre, chiefly below it. This is a much better point than the thigh, which I have seen recommended, and where a possible inflammation will interfere with walking and sitting.

3. The injection should be performed in a particular manner, the skin being lifted up by two fingers of the left hand to the height of at least two inches, and the needle then thrust in to its hilt so as to carry the fluid into the subcutaneous cellular tissue, or even into the substance of the muscle. This is a point of the greatest importance, and pain and inflammation will, to a great extent, be avoided thereby. *Even a hypodermic of morphine will produce a dermo-cellulitis if the fluid is injected into the substance of the skin itself.* The fluid should be injected slowly, and no fear need be entertained, with ordinary care, of penetrating the abdominal wall.

4. Always make the injections at the home of the patient, and keep her quiet in bed for several hours afterward, with cold-water compresses over the puncture, until experience has shown that she bears the treatment well.

5. Some pain, redness, and even infiltration will follow the majority of injections, but nothing more, if these rules be observed. I have even injected a whole syringeful of Squibb's fluid extract of ergot for post-partum hemorrhage, and have but once seen an abscess result therefrom.

6. Accordingly as the injections are borne, they may be made every other or every third day, and they should be continued for months if any benefit is to accrue from this treatment.

PART III.

GYNECOLOGICAL OPERATIONS.

GENERAL CONSIDERATIONS.

ON THE BEST TIME FOR OPERATING; ON PREPARATORY AND AFTER-TREATMENT; ON THE SUTURE; ON DISINFECTION; ON ANESTHESIA.

1. The Best Time for Operating.

The best time for the performance of an operation on the female genital organs is undoubtedly during the first or second week after the cessation of the menstrual flow. It is the result of experience, a result entirely in accordance with physiology and logic, that the general hyperemia and hyperesthesia (or, better, hyperneurosis) normally present immediately before and during the regular menstrual cycle renders the possibility of inflammatory reaction and hemorrhage greater after an operation undertaken at or near that epoch than in the intermenstrual period. It is therefore advisable to choose a date sufficiently distant from the last period to avoid these dangers, and, on the other hand, not so near the next period as to incur the risk of the not-yet-healed wound being injuriously affected by the then returning hyperemia.

It is rare for a healthy wound to require more than one week for its perfect healing, and if its edges have been well adapted and the circumstances are favorable to union by the first intention, that fortunate result is usually attained within the first forty-eight, and permanently secured after ninety-six hours. The recurrence of the menstrual congestion and flow after the latter period will rarely injure the freshly healed wound, even though the operation have been one on the cervix uteri or the perineum. A week of perfect vascular and nervous rest must, therefore, ordinarily suffice to insure permanent union; but in view of the tendency to inflammation and suppuration of cellular tissue in the vicinity of wounds, and of possible septic infection even at a late day, it is usually advisable to have at least two weeks' freedom from menstrual excitement for every operation in or about the female genitals. If a woman is regularly "unwell" every twenty-eight days, and her period averages five to seven days, she has about

twenty-one days of intermenstrual rest. Of these, three must be deducted at the end of the last and three just before the beginning of the next period, in order to avoid a possible recurrence or premature appearance of the flow from the excitement of the operation, and we have at least fifteen days at our disposal, quite sufficient for even the largest operation in gynecological surgery, ovariotomy, or laparo-hysterectomy. Only in case of prolonged convalescence might the menstrual hyperemia produce febrile exacerbations after the fifteenth day from the operation.

If feasible, then, an operation should be fixed for the third day after the complete cessation of the menstrual flow, and, ordinarily, not later than the tenth day. In case of urgency, the risk may certainly be taken of operating at so late a day as to render the inception of the flow probable before the stitches are removed. In that case it is by all means advisable to await the cessation of the discharge before removing the stitches, in order that the fresh union may not be disturbed by the congestion natural to the menstrual epoch, or by the forcing of blood between the stitches.

The time of year most favorable for operations is undoubtedly the autumn, early winter, and early summer. The last half of the winter, particularly the months of February and March, is the least favorable; at this season, not only has the health of mankind in general, especially in cities, become deteriorated by the labors, excitements, and dissipations of the past winter, but, with the melting of the snow, endemics of contagious and infectious diseases (scarlatina, measles, diphtheria, puerperal fever, erysipelas) are more prevalent. Besides, in hospitals, the more or less confined wards have gradually become contaminated, in spite of ventilation and disinfection, through the accumulation of miasms and gases, and a condition unfavorable to the speedy union of wounds, known as hospitalism, manifests itself. It is not uncommon for the surgeons of some hospitals to entirely desist from operating during such a time, until by thorough disinfection the taint has been eradicated. For this very reason one of our best hospitals, the New York Woman's Hospital, closes its doors to patients from July 1st to September 1st of each year.

In the summer months wounds generally heal very well, and there is no objection to operating on that score. But, in our climate, the usual intense summer heat renders a sojourn of several weeks or longer in bed exceedingly irksome to most patients, and all postponable operations are therefore usually deferred till cooler weather.

Whenever, at any time of year, there appears to be in a certain community a disposition for wounds to heal badly, or an endemic of infectious diseases springs up, it is best to defer operations until the often undefined danger is past. Still, with careful antisepsis, even under such circumstances, good results can be achieved, especially in private practice. Thus, in the month of March, 1882, when puerperal septicemia was raging (I myself saw five cases in consultation during that month), when the Woman's Hospital was closed to operations on account of the recent uniform bad results, and when even minor plastic operations in the city did badly, I happened to perform eleven operations in my private practice (one ovari-

otomy, three cervix lacerations, three secondary perineorrhaphies, one cystocele operation, one excision of vaginal cyst, one removal of fibrous polypus, one amputation of cervix by galvano-cautery wire), and all did perfectly well, with the exception of one case of perineorrhaphy, which developed a pneumonia, from which the patient recovered with a perfect perineum.

This species of "genus epidemicus" is far more likely to rage in a crowded city than in the country.

When to *perform an operation on a pregnant or puerperal woman* is a question of some importance.

The indication for the performance of an operation on a pregnant woman, whether on her genital organs or on any other portion of her body, will depend entirely on the urgency for interference and the danger of waiting until after delivery. In the case of some disease which, if allowed to proceed undisturbed, may prove fatal before the end of pregnancy (such as cancer of the breast, cervix, external genitals, or of any organ where its surgical removal is feasible); or of an affection the existence or growth of which may interfere seriously with delivery (such as ovarian and uterine tumors, contraction, malignant or benign, of the cervix, vagina, or vulva, tumors of the external genitals), any immediate operation may be indicated, in spite of the risks which may attend, both as regards the interruption of pregnancy and the occurrence of septic infection in that particularly susceptible condition. Thus, amputation of an extremity, excision of the breast, removal of the cancerous cervix, or of an ovarian tumor or fibroid polypus, or a hypertrophy of the external genitals, have been successfully performed on women in various stages of pregnancy. I have even assisted at an operation for closure of a lacerated cervix, in which the pregnancy (unsuspected, or the operation would not have been done) went on to term. In a similar case of my own, however, and in one of amputation of the cancerous cervix, the pregnancy also being unsuspected, abortion took place. I have also partially excised a cyst in the anterior vaginal wall, and split and cauterized an abscess of the Bartholinian gland and removed an epithelioma of the posterior lip of the cervix during the earlier months of pregnancy without injury to that condition.

The nearer the seat of the operation is to the uterine cavity the more likely is an interruption of the pregnancy.

Operations on parts which are liable to be torn again during the forthcoming delivery should not be performed during pregnancy. Such are those for lacerated cervix and perineum, which should be deferred until after delivery, no matter how annoying these lesions may be. Profuse cervical leucorrhea and prolapse of the vaginal walls (rectocele and cystocele), both of which are very common occurrences during pregnancy, should be palliatively treated by astringent tampons and the woman made comparatively comfortable until after confinement.

How soon after confinement may a woman be operated on for some lesion of her genital organs? The normal period of involution of these organs should always be allowed to expire before performing an operation on

them. If a lacerated cervix or perineum requires stitching (these being the usual operations called for in consequence of and after delivery), the operation should be deferred until at least two months have elapsed after confinement and the tissues have regained their ante-puerperal condition as to vascularity and reparative power. Before the end of the second month the frequent persistence of the lochial discharge might interfere with union, and the succulence and hyperemia of the parts naturally persisting after pregnancy must lead to a cutting through of the sutures. As soon as cicatrization of the wound has taken place, or the torn surfaces have assumed a pale, but slightly secreting character, the time for the operation has, *ceteris paribus*, arrived.

It must not be supposed that lactation will interfere unfavorably either with the success of the operation or the nutrition of the infant. Trachelorraphy is but rarely followed by constitutional or local disturbance of any kind, and perineorraphy, if healing proceeds favorably, does not injuriously affect the character of the milk. The only precautions to be observed are not to apply the child to the breast for twenty-four hours, when all traces of the anesthetic will have disappeared, and to observe even more than the usual cleanliness about the wound to avoid possible absorption of septic material.

Particularly as regards laceration of the perineum, I think an early operation advisable, in order that the injurious effects of the loss of support of the vagina and uterus (rectocele, cystocele, descensus, retroversion, chronic leucorrhea) may be anticipated. Lacerations of the cervix are seldom recognized soon after delivery, for the reason that but few general practitioners examine a woman either immediately after labor or before discharging her from observation, and thus do not become aware that the cervix was torn until later symptoms again direct the patient to them, or a specialist is consulted. While I have repeatedly had the opportunity to operate for lacerated perineum several months after the delivery at which the accident occurred, all my operations for lacerated cervix were done one or more years after the delivery, when the usual symptoms following that lesion had had time to develop.

The natural application of this experience must be to advise that physicians make it their invariable rule to explore the condition of cervix, vagina, and perineum with the finger immediately after delivery, and by finger and speculum (if the first examination revealed more or less injury) before discharging the patient from their obstetrical care. A good plan is to request the patient to call at the office on one of her first walks or drives after discharging the nurse, by which time sufficient involution will have taken place to enable the physician to determine whether the lesion detected immediately after labor requires operation, and if so, what preparatory treatment is needed. This remark applies chiefly to laceration of the cervix, the immediate union of which by sutures is scarcely ever practicable under the conditions as to light, hemorrhage from the uterine cavity, exhaustion of patient, edema of the parts, etc., present after nearly every labor. As for rupture of the perineum, I need hardly say that if of

sufficient extent to merit the name, it should be sewed AT ONCE. If primary union does not take place, which is the case in from twenty-five to thirty-three per cent. of these immediate operations, the secondary operation will be indicated in due time. If this rule were universally observed of *always* examining a woman after delivery with the index-finger in the rectum and the thumb in the vagina, and estimating by the tissue to be felt between the two whether and how much the perineum is torn, and if found sufficiently injured, of sewing it at once, the cases of secondary operations coming to the specialist would be diminished at least one-half.

The operation on the perineum at a later period—several hours to two days—usually fails, although a German writer has recently reported several successes as late as thirty-six hours after labor. I have operated but twice, once successfully in a consultation case twelve hours after labor, and once, also in a consultation case of complete rupture, forty hours after delivery, inserting eight silver-wire sutures after the Emmet method, and failing to secure union. If a plastic operation has failed, it is usually advisable to wait until the wound has entirely cicatrized over before renewing the attempt. However, in one instance where a cervical laceration gaped completely when I removed the stitches one week after the operation, despite the utmost care observed to insure union, in a spirit of desperation I scraped the granulating surfaces with a knife and immediately reunited them with silver sutures, telling the patient to go about as usual and come to my office to have the stitches removed in ten days. She did so, and I found the wound completely healed! I do not care to recommend this practice, however, but mention the case merely to show that such a tertiary operation, if I may so call it, *may* prove successful.

These two lesions of lacerated cervix and perineum, being produced by essentially the same causes—rapid labor, large child, and unyielding tissues (primiparæ)—very frequently occur together, and may both need repair. In order to avoid two separate operations, with their disagreeable companions of anesthesia and confinement to bed, the idea naturally occurs to every operator to do them both at one sitting. As regards saving of time the object is undoubtedly achieved; but the length of the two operations combined, the possible interference with the union of the perineal wound by the not unusual muco-sanious discharge from the cervix, and the necessity for deferring the removal of the cervical sutures until the perineum has gained sufficient strength to bear the traction of a Sims speculum—these reasons to a great extent outbalance the advantages of the double operation. In the few cases in which I have performed it, I have not found the combination as successful as I desired in securing clean union; perhaps the natural haste with which one is liable to perform operations that together may occupy one to one and a half hour, the patient being under full anesthesia all this time, may partly account for hurried paring and suturing and imperfect result. Still, I am inclined to try the combination whenever the patient appears strong and able to take ether well, and when she cannot spare the time or positively objects to two separate operations. The cervix may then be sewed with

catgut, which need never be removed, and thus the future stretching of the fresh perineum for the removal of the cervix sutures is avoided. In such cases the cervix can usually be readily drawn to the vulva and the knotting of the sutures is easy. Silver is, however, safer than catgut, and the sutures need not be removed for three to four weeks, when the new perineum generally bears the stretching of the Sims speculum. In several cases of prolapsus uteri with rectocele and cystocele, and lacerated cervix, I have even, for like reasons of economy of time, combined the operation on the anterior vaginal wall with the other two, and have had very good results. The cystocele operation in such cases was a peculiar one devised by Stoltz, of Nancy, and is known as the running-bag method, which I will describe hereafter.

In several instances I have also combined the removal of hemorrhoids with trachelorraphy, the latter, of course, being first performed. The hemorrhoids were removed with the Paquelin thermo-cautery, and the external flaps of skin trimmed off with scissors, and the wound was closed with fine silk sutures. When the stitches were removed from the cervix on the tenth day, the rectum was always found able to bear the backward pressure of the speculum.

In cases of hemorrhoids and lacerated perineum, it is advisable to remove the piles first, and when the rectum is restored to health, operate on the perineum. The tenesmus and edema which usually follow the hemorrhoid operation would be very likely to interfere with the undisturbed healing of the perineal wound. Two pathological conditions which are very frequently associated are laceration of the cervix and villous degeneration of the endometrium; indeed the rent retards involution of the uterus and favors hyperplasia of its lining membrane. Before repairing the rent it is well to restore the endometrium to health by curetting out the vegetations and repeated applications of tincture of iodine. Some operators curette and sew the tear at one sitting. But I think the chances of ultimate cure of the hyperplasia and vegetations is rendered doubtful thereby; besides the bloody oozing following curetting for several days might interfere with healing by first intention of the cervical wound. I greatly prefer to put the endometrium in as healthy a condition as possible before operating on the tear, and my experience has led me to feel that no class of gynecological cases offers more certainty of perfect cure than these.

As to when ovarian tumors should be operated on, is a question still somewhat under discussion. While some operators still adhere to the old rule of Spencer Wells to wait until the system begins to show the effects of the disease, until cachexia supervenes and the peritoneum has become toughened by long contact with the growth, other more progressive and bolder surgeons agree with Tait in operating as soon as the tumor has attained a noticeable size and is undoubtedly growing. It seems to me that, while it would be unjustifiable to remove an ovarian tumor which neither by its size, location, nor symptoms seriously distresses the patient or impairs her health or activity, it must be equally wrong to defer the operation until the patient's constitution begins to suffer. The stronger a

woman is the better she will be likely to bear a severe operation. And in our present days of Listerism (I mean scrupulous cleanliness of everybody and everything about the operator, assistants and patient, by whatever means secured) the old bugbears of peritonitis and septicemia are by no means so terrible as in former days. While no rule should cover every case, it seems to me that the proper time to operate on an ovarian tumor (provided the operator has the choice of time) is when the tumor is evidently growing, when sharp abdominal pains lead to the suspicion of localized peritonitis and adhesions, and when the tumor by pressure, pain, or otherwise, seriously distresses the patient. The moral indication of mental worry through knowledge of the presence of the tumor and fear of its ultimate consequences may occasionally require consideration.

When to remove the "normal"—that is, not enlarged—ovaries and Fallopian tubes, for local and general symptoms apparently depending on disease of those organs, is a subject at present agitating the professional mind. Battey's operation, the removal of the ovaries alone, is called for whenever constantly recurrent menstrual pain, of so severe a character as to render the life of the patient unendurable and practically useless, continues for years, resists all local and general medication, and ultimately bids fair to unsettle her reason and permanently shatter her nervous system. Further, when a fibroid of the uterus, either by its rapid growth, large size, or the hemorrhage it produces, calls for operative interference, and is not removable, the attempt should be made to check its growth by removing the ovaries and thus anticipating the menopause.

The ovaries have also been successfully removed by Hegar and others in cases of so-called recurrent peritonitis and cellulitis, when every menstrual period ushered in a more or less severe attack of pelvic pain attended with febrile reaction. It is for this class of cases, and for those cases of long-standing cellulitis of the broad ligaments (as we have been accustomed to call them), where the lateral portions of the pelvic cavity feel puffy, doughy, more or less infiltrated, that Lawson Tait has recently advised and successfully practised in numerous cases the removal of not only the ovaries but also the tubes. In chronic inflammation and dilatation of the latter, chiefly, he sees the cause of the suffering and persistence against all remedies so characteristic of these cases. It is the dilated tube, filled with pus, which we feel at either side of the uterus and which has so long been mistaken for a plastic exudation in the cellular tissue of the broad ligament. Tait's specimens (over sixty) certainly confirm his diagnosis, and his marvellous results (only two deaths, and restoration to health in all the others) speak not only for his operative dexterity, but also for the correctness of his statements. When we can point to similar results and a like low mortality from this operation, we can afford to risk a mistake in diagnosis occasionally. At the present time, what we need before entering on a campaign of oöphoro-salpingectomy is more accurate means than we now have of diagnosing the enlargement of the tube. So far we are hardly prepared in this country to act on Tait's rule, that cases of so-called chronic cellulitis of the broad ligament which resist the usual treatment over six months,

are instances of salpingitis and pyosalpinx, and call for the removal of the offending organ.

It should be stated that Tait advises the removal of the tubes together with the ovary in every case of Battey's operation, as he thinks the operation imperfect if the tubes are allowed to remain.

I need hardly say that the general health of the patient should be such that she will not only survive the operation, but stand a fair chance of recovery from the various intercurrent dangers which may beset her afterward. It is hardly worth while to operate on a patient whose recuperative powers are so feeble that she can scarcely rally from the operation or supply plastic material sufficient to close the fresh wound. This remark applies equally to the lesser plastic operations on the female genital organs, as to the capital operations of laparotomy, etc. A secondary operation for lacerated cervix or perineum gives a much better result if the patient is strong and well nourished, than if she is anemic, and physically and mentally debilitated. The indication, therefore, is to "build up" all such patients before operating.

The *choice of the place to operate*, whether in a hospital or a private house, will come up for decision only in cases of private patients whose means enable them to secure such attendance and comforts at their homes as the operation demands. It goes almost without saying that a patient who can afford neither a nurse, nor suitable food, nor the quiet necessary to recovery at her home, *must* go to a hospital. Patients, even, who can have fair attendance at home, but whose quarters are cramped, or who are liable to be troubled with household and family matters, had much better, especially if the operation is a serious one, take a private room in a hospital. For minor operations, such as trachelorrhaphy and perineorrhaphy, chiefly the former, where but little trained nursing is needed, even moderate conveniences at home will suffice, and such patients certainly need not leave their families to be confined in a hospital. To insist upon their doing so, when their means allow them to be well taken care of at home, is simply arbitrary. I have done numerous operations of this kind at private houses, and in my earlier years not always in brown-stone fronts, and have seldom failed to get a good result. In fact, my first failure in over sixty perineorrhaphies was in the hospital, and many of these operations had been done in tenement-houses, with often no nurse but some friend of the patient.

As for capital operations, like laparotomies, if the patient can afford *all* the medical attendance, nursing, and conveniences which such cases require at her home, I unhesitatingly prefer it to even the private rooms of a general hospital. I cannot divest myself of the idea that there is less danger of septic infection in an airy, clean room of moderate size in a private house, than in a hospital with its thousand and one sources of contamination, no matter how well it be organized.

Still, I also believe that scrupulous cleanliness and thorough disinfection will render a hospital—not only the operating-room and private rooms, but also the general surgical ward—as absolutely pure as a private house. In proof of this assertion, I have during the past year put two oöphorectomies,

one ovariotomy, one colpo-hysterectomy for cancer, one large cyst of the broad ligament where the sac was stitched to the abdominal wound, and one enucleation of a large cervical fibroid obstructing labor, into my general uterine ward at Mount Sinai Hospital, where twenty cervix, perineum, fistula, and other cases, operative and not, were lying—and all recovered with scarcely a rise of temperature.

The better the hygienic conditions and surroundings of a patient after operation, the more favorable, of course, *ceteris paribus*, are her chances of recovery. The most favorable conditions for operation are, therefore, such as are afforded by the pavilion system of hospitals, where each patient occupies a separate room, which is thoroughly disinfected before being used again. Such a hospital surpasses even the best private dwelling, since physicians and competent nurses, with all conveniences, are constantly at a moment's notice.

2. Preparatory Treatment.

The *general* treatment to prepare a patient for an operation consists chiefly in tonics—medicinal and hygienic—until her system is brought to a good condition for the reparative processes which surgical interference usually calls for. Quinine, iron, strychnine, the phosphates and hypophosphites, cod-liver oil; bathing, massage, general faradization; exercise, air, nourishing diet (stronger stimulants only in moderate quantities, wines and malt liquors in fair quantity); cheerful surroundings, sunlight —all these agents will tend to invigorate the system and render it more competent not only to stand the shock of the operation, but also to repair the necessary injury inflicted. In the major operations, such as laparotomy, this preparatory "building up" is of supreme importance, as the shock of these operations is often so great that a debilitated system is unable to rally from it. As a rule, the better the physique and morale of the patient, the better her chances for recovery from any operation. It is not the danger of inflammation which we fear now; our modern antiphlogistic measures enable us to deal with this ancient bugbear with tolerable certainty; nor do we fear the invasion of the mysterious bacteria and bacilli, the carriers of septic infection, for Listerism (that is, *absolute* cleanliness) will keep them at a distance or render them innocuous in a large proportion of cases. What we need chiefly is a strong, vigorous constitution to resist the dangers of the operation itself, and the subsequent more or less tedious recovery. We want tissues which will unite by first intention; and these we can get, whenever feasible, by a previous course of tonics. Only in urgent cases would it be safe to operate on a debilitated patient and to take our chances of union.

A constitutional taint, such as, above all, syphilis, then purpura, gout, or rheumatism, if in the active stage, will counter-indicate an operation. But if latent, not manifesting acute or local symptoms, a plastic operation will often succeed. Thus, if the vulva was covered with mucous patches, which have completely disappeared under specific treatment, a perineor-

rhaphy may be perfectly successful, even though there be latent evidences of syphilis in other parts of the body. But it is well to continue the constitutional treatment for some time after the operation. That attention should be paid to regulating the functions of the bowels and kidneys need scarcely be emphasized. That of the skin has already been referred to in speaking of the necessity of bathing and massage.

Local preparatory treatment comprises such measures as tend to put the parts to be operated on in as good a condition for healing as possible. Thus, a lacerated cervix is treated by tincture of iodine, tannin and glycerine, and iodoform, until the frequently existing hyperemia or hypersecretion (endotrachelian catarrh) is removed; a redundant (subinvoluted) vagina (rectocele or cystocele) is reduced in size as much as feasible by astringent tampons; a lacerated perineum is glazed over by astringent injections and dusting with iodoform; a vesico-vaginal fistula is rendered accessible and its edges are softened by hot-water injections and columning the vagina with cotton.

This treatment may extend over several months; but the time thus occupied is not wasted, since the better the reparative power of the injured parts, the better the result of the operation. Indeed, many cases of trachelorraphy or fistula operation would be utterly hopeless unless the parts were first put in good condition for healing.

It must be remembered that to secure union by first intention the tissues should be neither *too* hyperemic, nor *too* anemic, and that, above all, cicatricial tissue manifests but little tendency to primary union. Therefore, such cicatricial tissue as lies in the way and cannot be dispersed beforehand, must be removed by the knife or scissors at the operation.

The *after-treatment* consists mainly in a continuance or renewal of the preparatory tonic treatment, in tepid antiseptic, perhaps astringent injections; in tannin tampons and iodine applications to the cervix; in vaseline inunctions to the perineum; in abdominal supporters after laparotomy, and various other measures needed to complete the restoration of the parts, which will be discussed in their respective places.

The diet should depend on the ability of the patient to take much or little, and on the necessities of the case. For the first few days it should be fluid, but nutritious, mainly milk; in laparotomies, it is seldom anything but fluid for the first week or more, and nothing but cracked ice for the first twenty-four hours.

Stimulants should be given entirely in proportion to their need. So long as the nausea of the anesthetic lasts, nothing but cracked ice, perhaps a lemon to suck, should be given. Plain water to drink, also carbonic acid or Vichy water may be allowed cold in moderate quantity. Bedsores should be prevented by occasional change of position, by alcohol rubbings, and by air-cushions. The temperature of the room should not be above 70° F.

3. The Suture.

The principles governing the union by suture of wounds of the female genital organs are essentially the same as those guiding other surgical operations. But the instruments and material for sutures, and the rules for suturing gynecological wounds, are peculiar to that class of operations, and a description of these will, I think, prove instructive and useful.

Operations on the female genital organs, particularly those for repair of injuries to the vulva, vagina, and cervix, are chiefly of a plastic character, in the course of which it is necessary first to remove excessive or pathological tissue, and to prepare a fresh raw surface of varying shape and dimensions, and secondly, so to adapt the edges of this surface as to secure rapid and complete union of the opposing surfaces. To attain this end, two cardinal principles must be observed: 1. Thorough, careful, and regular paring, and 2. Exact and complete approximation of the surfaces to be united. These surfaces may be considerable in extent, as in operations for lacerated perineum, prolapsus uteri et vaginæ, or the tissues may be dense and difficult of approximation, as in trachelorrhaphy and vesico-vaginal fistulæ, or they may be unusually soft and vascular, and both of the above-mentioned cardinal rules may be difficult of execution. Thus, in colpo-perineorrhaphy it may not be easy to remove every strip of mucous membrane, and small patches of the latter may accidentally be left and interfere with perfect union, or the length and circuitous course of the sutures may facilitate the formation of small pockets in the wound in which secretion or pus may accumulate. Again, in trachelorrhaphy, the density of the deeper tissue of the cervix may make it difficult to prepare a sufficiently large raw surface, or to approximate the everted lips with the sutures; or, in the latter case, as well as when the tissues are too succulent, the stitches may sink too deep and cut their way out before perfect union has taken place. Or they may obstruct circulation and cause sloughing or suppuration in the wound.

Ceteris paribus, the larger the raw surfaces the better the chance of their uniting. Hence, where there is tissue to spare it is always safe to make the denudation as ample as is consistent with the normal shape and size of the part to be restored.

It is also desirable to have the wound as smooth as possible. Ragged shreds of raw tissue should be trimmed off, the edges of the wound smoothed with scissors, and all superfluous tissue removed. Coagula should be wiped away and the wound dried as much as possible by carbolized sponges before approximating its surfaces and securing the sutures. It is not necessary that bleeding should be arrested before closing the wound; indeed, in many operations on the cervix, vagina, and perineum, the raw surface oozes until the sutures compress the bleeding vessels. But all loose blood should be sponged away immediately before the wound is closed. In laparotomy, of course, all intraperitoneal oozing should be

arrested before the abdominal wound is closed ; at least this is the rule in this country, although I am informed that Tait is not so particular in this respect as one would think advisable ; still, his unequalled results seem to prove that, in England at least, a little bloody serum in the peritoneal cavity does not interfere with recovery.

For arresting hemorrhage I have always preferred ice-water to hot water, because I am always sure of having the ice-water cold enough, but cannot always get or keep the hot water *hot* enough. Still, occasionally I found very hot sponges effectual in temporarily arresting capillary oozing. The effect, however, was always temporary, and this has been my experience with hot water as a hemostatic throughout. It arrests the bleeding, but not permanently as cold does. In laparotomies, to be sure, I use hot sponges for the peritoneal toilet. The German method of irrigating the wound (as in trachelorrhaphy or perineorrhaphy) with a hot or cold antiseptic solution, instead of sponging, has not become popular with us, nor do I think it so convenient as the old method of sponging.

Spurting arteries, which are sometimes met with in cervix, fistula, and perineum operations, should be twisted or compressed by artery forceps on general principles, or perhaps ligated with silk or catgut.

The *needles* adapted to gynecological operations differ with the particular operation. For the operation of laceration of the cervix uteri, short,

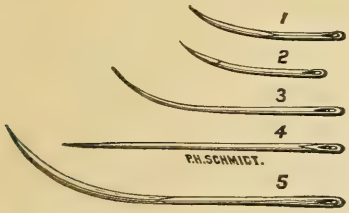


FIG. 218.—1, Sims' Cervix Needle. 2, Emmet's Fistula Needle. 3, Emmet's Cervix Needle. 4, Straight Perineum Needle. 5, Schnetter's Cervix Needle. (This last needle is figured nearly double the size used) (P. F. M.).

FIG. 219.—1, Simon's Vesico-vaginal Fistula Needle. 2, Large Needle for Primary Perineum Operations and Abdominal Wall in Ovariotomy (P. F. M.).

stout, round, slightly curved needles with bevelled, or cutting point, are used ; for the operation of lacerated perineum, straight needles of different length, similar to ordinary darning-needles ; for plastic operations on the vagina (rectocele, cystocele, prolapsus uteri) short, round, slightly curved, or ordinary flat, slightly curved, surgical needles, have been found the most serviceable. For vesico-vaginal fistula operations, short, round, sharp-pointed needles, of different curves, from a slight to almost a semi-circular curve, answer best. For laparotomies, straight lance-pointed needles, for pedicle and adhesions, or if both ends of the suture are threaded, for the abdominal wound, passed from within outward ; or long, strong, sharply curved needles, with sharp point and cutting edges may be used for the abdominal suture, being passed from without inward on one side, and from within outward on the other side. These same needles, last mentioned, are, in my opinion, the best for primary union of a perineal laceration.

While round needles do not pierce the tissues as well, they are less likely to cut vessels and cause hemorrhage. Needles with lance or spear points may accidentally strike a large vein or even an artery, and produce considerable oozing. Care should therefore be taken always to avoid visible or pulsating vessels in passing a suture.

Needles immovably attached to a handle have been used for perineorrhaphy (Peaslee's needle, Fig. 220), and for passing the ligatures through ovarian pedicles and adhesions. There are several curves of this needle which can be screwed on the same handle. The eye is near the point, and a loop of silk is passed through it and knotted ; when the needle emerges from the tissue, the loop of silk is drawn out with a tenaculum, the silk ligature or wire suture is hooked in, and the needle is drawn back as it entered with the suture. This form of needle is still used in laparotomy, for the pedicle and the abdominal wound, otherwise it has been superseded by the movable needles mentioned.

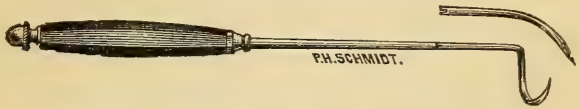


FIG. 220.—Peaslee's Needle for Perineorrhaphy, etc.

The *material used for sutures* is either silk, catgut, or silver wire. Substitutes for these have been introduced from time to time, such as whale-sinew, silkworm gut, plated iron wire, etc., but have not stood the test of experience. For all operations where it is not desired to leave the suture in the tissue longer than four or five days *silk* doubtless surpasses every other material. And if properly asepticized it can even be retained a week, or longer, without exciting suppuration. Witness the ligatures on adhesions and pedicle in ovariotomies, which are dropped and never heard from again. To render silk properly aseptic, it may either be boiled for an hour in a ten per cent. solution of carbolic acid, then washed in a five per cent. solution, and kept in a three per cent. solution in a well-stoppered bottle until used (as was hitherto the practice) ; or according to the new custom it may be boiled in a one to one thousand solution of corrosive sublimate for half an hour, then washed in a one to two thousand, and preserved in the same solution until used. If kept very long, however—that is, several weeks or more—it is liable to get rotten and break easily. It is well, therefore, to prepare only a little at a time, or, better still, for each operation. The latter should certainly be the rule for capital operations, like laparotomy, where it is of prime importance that ligatures do not break.

The best is the braided silk or cord of Archibald Turner & Co., which comes in four graded sizes, of which the finest is for small artery ligatures and fine sutures ; the second size for larger ligatures and as loops for wire sutures ; the third size for adhesions, sutures of thick tissues (abdominal wall, perineum, cervix, fistula), and as guide for large wire sutures (in perineorrhaphy) ; and the fourth, or largest size, single or double, for pedicle

in ovariotomy, Tait's and Battey's operations, etc. It is always well to have some of each of these sizes prepared for each operation, except perhaps trachelorrhaphy, where sizes Nos. 2 and 3 will suffice. In laparotomy I never use any ligature or suture but this silk. A caution, in tying this braided silk, may not be amiss, viz., when a very tight knot is to be tied, as, for instance, when ligating the pedicle of an ovarian tumor or a thick adhesion which may shrink and loosen the ligature, do not cross the silk twice in the first knot, as is usually done to prevent its slipping, but have it held by forceps until the second and final knot is well tightened. I have repeatedly noticed that doubling the first loop causes the braided silk to snap when the second knot is tightly drawn. This is not the case with ordinary twisted silk. Further, the knot of braided silk occasionally slips, as I have noticed in closing the abdominal wound after laparotomy, and it is well then to tie a third knot for security.

Catgut comes in three sizes, of which No. 1 is used for fine artery ligatures and sutures, Nos. 2 and 3 for strong ligatures and sutures. Its chief advantage is its ready absorption when it is desired to drop it permanently, as for adhesions and vessels in laparotomy, and in closing wounds, from which it would be difficult to remove it later on, as in lacerated cervix and operations on the vaginal wall, together with perineorraphy. In the latter operation (colporrhaphy), particularly, I have found it useful. But its very advantage of readiness of absorption may itself prove a disadvantage, in that the ligature or suture becomes absorbed too soon (its usual time is four to six days) before thorough thrombosis or firm union has taken place, and secondary hemorrhage or reopening of the wound may occur. I confess that I do not trust catgut where I am particularly anxious to avoid either of these occurrences, and have felt easy in using it only in trachelorrhaphy and colporrhaphy (combined with perineorrhaphy), occasionally to ligate an artery on the surface of a perineorrhaphy. In laparotomies I have felt much safer with silk, the presence of which very rarely causes subsequent trouble. Catgut is bought preserved in oil, and is disinfected by keeping it in a five per cent. solution of carbolated oil. It is threaded and tied precisely like silk.

Silver wire, as a suture, was first popularized by J. Marion Sims, to whom also we owe the various instruments necessary to its proper adjustment. Its great advantage over silk was that it could be left in the tissues for an indefinite length of time without absorbing fluids, becoming offensive, exciting suppuration, or cutting through, features which rendered it particularly available for plastic operations. It was these qualities which enabled Sims to cure his first case of vesico-vaginal fistula. In justice it must be said, however, that Simon, of Heidelberg, cured equally large fistulæ with raw silk sutures, which were allowed to remain a week, and did not cut through. But silver wire has become so popular in this country that it is the suture universally employed for all plastic operations on the female genitals, and I must confess that, for neatness, cleanliness, and ease of handling in cavities, I certainly prefer it to silk.

Silver wire comes in different thicknesses, and is usually sold by weight.

The thickest size used in gynecological operations is No. 25 ; the thinnest, for superficial sutures, No. 33. The usual size for trachelorrhaphy is No. 27 ; for perineorrhaphy, No. 26 ; for fistulæ, No. 28. Special care should be taken to have it perfectly pure, and so malleable that it will not snap when tightly twisted.

Wire sutures should be from ten to twelve inches long, in order to allow for loose twisting and handling before permanent twisting. The wire can be kept unbent and smooth in a piece of black rubber tubing slightly shorter than the sutures. Before using, they should be polished off and disinfected, as they become tarnished.

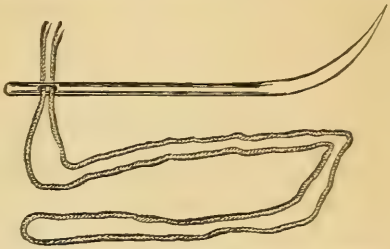


Fig. 221.—Double Threading of Needle for Wire. First step (P. F. M.).

As a rule, wire is not used directly in the needle, but indirectly, being hooked to a loop of stout silk with which the needle is threaded. It is a matter of considerable importance that the needle be so threaded that no knot or unevenness at the eye interferes with its easy passage through the tissues. The method in vogue at the Woman's Hospital for many years, in threading all needles for wire, whether for cervix, perineum, or other operations, is the following : Both ends of the silk are passed through the eye (Fig. 221), and then tied

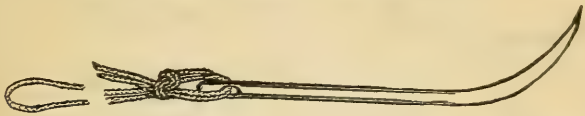


Fig. 222.—Double Threading of Needle for Wire. Second step (P. F. M.).

tightly in a single knot, which is laid smoothly in a line with the shaft of the needle (Fig. 222). If this single knot is tightly drawn, and the eye part of the needle is grasped in the needle-holder, the knot will rarely slip, especially when the silk becomes moist. Another method, which is practicable only when braided silk is used, has been devised by my assistant,

Fig. 223.—Wells' Method of Threading Needle for Wire (P. F. M.).

Dr. B. H. Wells, and consists in transfixing both strands of silk after they have been passed through the eye with the needle, and then drawing the loop thus made tightly down over the head of the needle (Fig. 223).

A very easy and reliable method of threading a needle, chiefly for perineorrhaphy, where there is less danger of confusing the threads than in the vagina, is to pass the two threads in opposite directions, and then

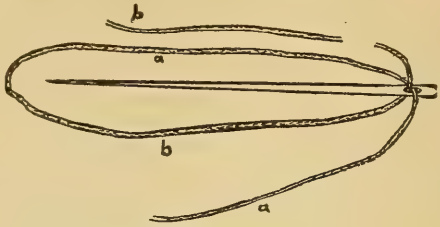


Fig. 224.—Chamberlain's Method of Threading Needle for Wire (P. F. M.).

draw them through two to three inches, and leave the ends entirely untied; the free ends of the silk are then almost as long as the loop, and are little liable to slip out when the needle is drawn out of the flesh. The entire absence of a knot or inequality in the loop is the great advantage of this method, for even the flat single knots described may catch in the depth of a long wound or in a tough cervix, and, particularly in the recto-vaginal septum, will enlarge the width of the suture-channel.

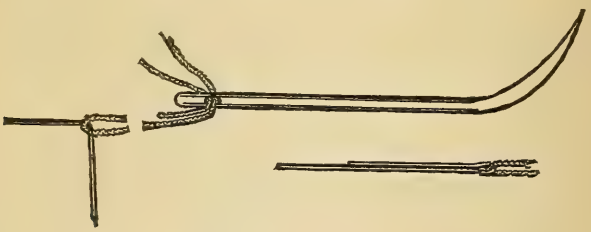


Fig. 225.—Wire Hooked into Silk Loop and Bent Down (P. F. M.).

It is, of course, understood that the silk is intended merely as a guide to the silver wire which is hooked into the loop of silk and smoothly squeezed down so as not to project (Fig. 225). The wire is bent at a right angle over the edge of a knife or scissors; if bent in a curve, it is sure to catch when being drawn through the tissues, and may then become detached, which requires the reinsertion of that suture. To avoid this, it is well to bend the wire down smoothly with the needle-forceps.

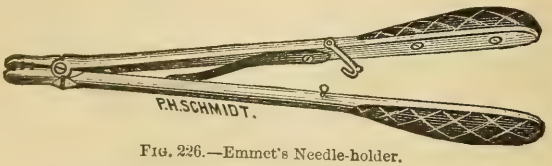


Fig. 226.—Emmet's Needle-holder.

The wire hook should not be twisted, merely bent; if twisted, the operator is delayed when detaching the wire after he has passed the suture.

For the purpose of introducing the sutures, needle-holders of different

pattern, have been constructed. I prefer that known as Emmet's, but that of Sims, and that known as the "Russian needle-holder," besides others, have each their partisans. The difficulty with almost all needle-holders is that they either do not grip the needle tightly enough, and it slips on being forced through the tissues, or that they grip too tightly and the eye of the needle is broken off. To obviate either of these occurrences, one

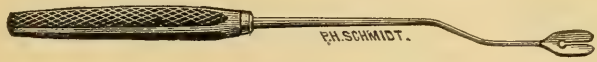


FIG. 227.—Sims' Shield.

jaw of the catch of the holder is lined with lead or copper, and the other is crossed by intersecting grooves, into which the needle is to fit. In spite of this, nothing occurs more frequently than to snap off the head of the needle by a sudden twist of the wrist.

It takes some experience to manipulate these holders well in the depths of the vagina, as in a difficult trachelorrhaphy.

It is generally a good plan to fasten the wire in the silk loop before passing the suture, as it readily happens that on rapidly drawing the needle out with the holder, the short silk loop attached to it is drawn completely

FIG. 228.—Wire-twister (P. F. M.).

through, and that suture is lost. If the wound is large and the needle cannot be passed underneath the whole of it at once (as in perineorrhaphy), or if the mobility of the part renders it difficult to pass the needle through both lips at once (as in trachelorrhaphy) the needle must be brought out at about the middle of the wound and immediately reinserted, and it is important then to see that only the silk is drawn out, for if the wire were withdrawn and then immediately reinserted, it would be very likely to kink and occasion trouble when the whole suture is drawn through. To allow this, the silk loop should be at least six inches long. If the suture is

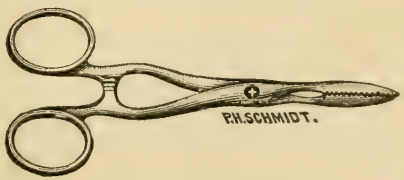


FIG. 229.—Hemostatic Forceps.

very long and there is a possibility of its catching in its track, the silk and wire may be smeared with carbolized vaseline. When the needle has been withdrawn from the sound flesh opposite its point of entrance, which should be done with the needle-forceps, care being taken not to nip off the point of the needle, it is well to take the silk loop in the left and the wire in the right hand, and by a rapid backward and forward motion quickly

draw it through. In this way catching of the loop or accidental kinking is avoided. An assistant can help the operator greatly by passing the hook of a tenaculum under the needle point as it emerges, and holding it up so that the operator can seize it with the needle-forceps and draw it through. When the time comes to twist the wires, the two ends are seized in the twister (Fig. 228) about two to four inches from the wound (in trachelorrhaphy two inches, in perineorrhaphy four inches), the free ends are cut off short at the twister, and with a tenaculum the wire is bent over the line of the wound, as seen in Fig. 230. The object of this is to make the wire when twisted compress the lips of the wound equally, and not cut into them, as it would do if simply twisted without previous bending. The same object can be attained by separating the wires after twisting by two tenacula passed under the twist, and Thomas has devised a special instrument like a glove-stretcher for this very purpose. But the preliminary bending of the wire is the best method.

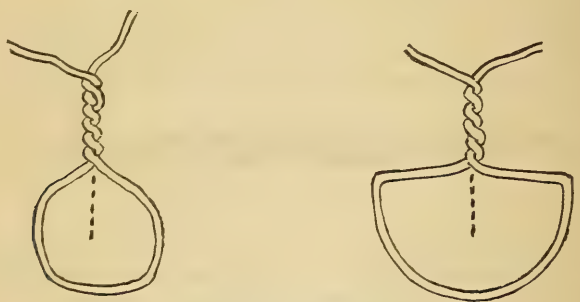


Fig. 230.—Incorrect and Correct Wire Suture (P. F. M.).

The shield (Fig. 227) is then passed over the two wires and pressed firmly down on the edges of the now united wound, and the wires are rapidly twisted until nothing more of the single wire can be seen. The rule is to twist until the triangle formed by the junction of the two ends of the wire becomes obliterated, because then we can be sure that both ends of the wire are in apposition, and consequently the lips of the wound also. The twisted ends are then cut off short and turned down, or left long and disposed of, as hereafter to be described. In approximating the lips of the wound, tenacula should be used, whenever needed, in order to secure smooth apposition, and superficial sutures should be inserted as occasion may require. The ends of the wire sutures should be prevented from injuring neighboring organs either by being turned down, as in trachelorrhaphy, or by being covered with rubber tubing, as in perineorrhaphy. Wire sutures may be left undisturbed for ten days, which is the usual time for removing them; or, if thought better, they may be retained for two weeks or longer. In removing them the best plan is to grasp the twisted ends with long dressing forceps, draw on them gently until the separate, glistening wire appears, and then cut this with long scissors, withdrawing the suture over the line of union, so as not to drag it apart.

The suture-canals generally close within three or four days after removal of the sutures. A pair of long, straight scissors with stout points will usually answer to cut the sutures; indeed, I employ them almost wholly. Albert Smith has devised a quite useful wire scissors, and Bache Emmet uses another of his own invention.

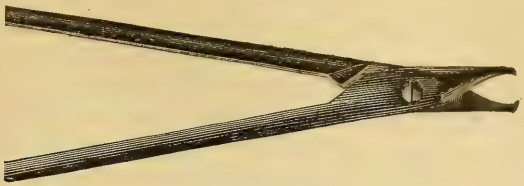


Fig. 231.—Smith's Wire-scissors.

I ought to say here that wire sutures or ligatures are now but little used in laparotomy, certainly not within the abdominal cavity, their use in gynecological surgery being restricted to operations about the cervix, vagina, and perineum.

4. Disinfection.

Disinfection applies either to the surroundings of the patient, to the operator, the instruments, or the wound itself.

It goes without saying, in the present age of Listerism, that everything about the patient, operating-room, operator and instruments, must be scrupulously clean at the time of the operation. The patient should have a warm soap-bath, her clothing should be fresh and disinfected; her pubes or labia should be shaved according as the operation is respectively either a laparotomy or a perineorrhaphy. The operating-room, whether in a private house or hospital, should be thoroughly disinfected immediately before each capital operation, the walls, ceiling, and floors washed with a one to one thousand solution of corrosive sublimate; and I have thought it best to have a couple of five per cent. carbolic sprays playing in the room for several hours before and during the operation.

In hospitals the operating-room is kept free of all curtains, hangings, carpets, etc. In private houses it is best to remove as many loose articles of drapery as possible, and, if there be any doubt as to the purity of the carpet, the latter also. For minor operations, like cervix and perineum lacerations, it is not, however, necessary to strip the room of all these things; only for capital operations is it wise to do so. Twelve hours before the time fixed for the operation, the windows of the room should be closed and the room filled with the fumes of burning sulphur, or of pure carbolic acid poured on chloride of lime. When the room has been exposed to these fumes for two or more hours, the windows should be opened, and the room thoroughly aired, and then the windows closed again and the sprays put in action. The temperature of the room should be about 75° for ordinary operations, about 85° for capital operations. Fresh air may

be admitted through a window, even during a capital operation, if there be no draft on the patient.

Assistants and spectators must not be too numerous, and must not, of course, have been in contact with any infectious or contagious disease within the last forty-eight hours.

The instruments, after having been scrupulously cleansed and scrubbed with emery-paper, if necessary, are bathed in a five per cent. solution of carbolic acid (the sublimate tarnishes them too much) for a few minutes, and are then immersed in Listerine poured in flat pans, in which they are kept during the operation. I prefer this, perhaps rather problematical disinfectant, because I am sure that the properly cleaned instrument cannot acquire new sources of infection in it, and because it does not irritate the hands like five per cent. carbolic acid or one to two thousand corrosive sublimate solution, when they are exposed to them for some time.

Sponges are boiled in a one to one thousand solution of corrosive sublimate, after having been treated as described on p. 67. During the operation they are washed in a one to two thousand solution of corrosive sublimate, which is made by pouring one tablespoonful of a solution of corrosive sublimate, of the strength of grs. ij. to ʒ j., into one quart of water.

The genitals of the patient are washed with a one to one thousand solution of corrosive sublimate, immediately before the operation, and after it is over, the wound, if it be an abdominal or perineal one, is kept covered with iodoform until, and for several days after, the stitches are removed. At least, in hospital practice I have thought best to do this. In private practice I have merely covered the abdominal wound with English lint, soaked in a one to three thousand solution of corrosive sublimate, changed as often as the dressing is renewed ; a perineal wound I have merely had syringed off several times daily with a two per cent. carbolized solution. After trachelorrhaphy I have used no antiseptics except two per cent. carbolized douches.

The hands and arms of the operator and his assistants should be thoroughly scrubbed with soap, and then bathed and rubbed with a one to one thousand thymol solution, which, if the operator has any ordinary regard for clean finger-nails and hands, generally ought to suffice to render him aseptic. A clean white apron, or linen coat, and entirely fresh clothing for laparotomies, should be worn by operator and assistants. Cloths and towels used during the operation I have wrung out in tepid one to two thousand corrosive sublimate solution.

The spray over the abdominal wound during laparotomy seems to me, if other antiseptic measures and thorough cleanliness are observed, entirely superfluous.

5. Anesthetics.

The anesthetic usually employed for gynecological operations in this country is sulphuric ether, by preference that manufactured by Squibb, of Brooklyn. Certainly in long operations ether is safer than chloroform ; but in examinations requiring an anesthetic, or in operations not likely to exceed fifteen or twenty minutes, I often use chloroform.

The best ether inhaler in my opinion is that of Clover, of London, which I imported several years ago, and have since used exclusively in private practice. The accompanying diagram will explain its use. Its chief advantages are: ease of anesthesia, and saving of ether, so that an operation lasting an hour will usually not require more than three ounces of ether. This point is of especial importance in capital operations where an avoidance of shock of any kind is desirable. A disadvantage is its expense. The old paper and towel cone, and Allison's inhaler answer very well as anesthetizers, but waste a great deal of ether, affecting not only the patient, but the physician who administers it.

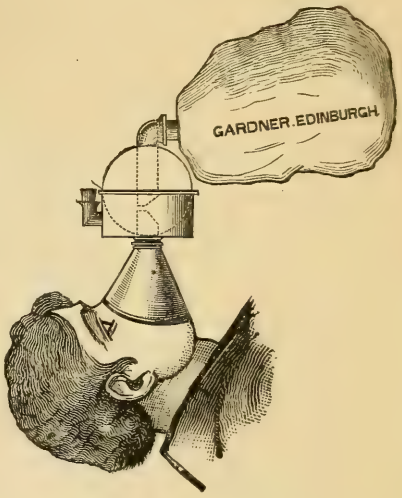


Fig. 232.—Clover's Ether Inhaler.

I am in the habit of giving patients, who, of course, have had no meal within at least six hours before an operation, thirty grains of bromide of potash about an hour before, and one or two ounces of whiskey half an hour before the anesthetic is begun, and think they then come more easily under its influence, and have less vomiting. I always have the ether given by a competent assistant upon whose caution and judgment I can rely; and do not bring the patient into the operating chamber until she is thoroughly unconscious.

I need hardly go into details here as to how to give ether, since the rules for that process are common to all surgical operations. I would merely say that retching and vomiting during anesthesia call for more ether, and that cyanosis demands fresh air. Further, that particular attention should be paid to the respiration of the patient; a woman who breathes well is not liable to collapse from the anesthetic, even if her pulse is a little feeble.

Another caution which has been impressed upon me by alarming collapse after three operations for colpo-perineorrhaphy—one in my hands, the others in those of colleagues—is not to lift the patient into an upright position after long anesthesia until she has fully recovered consciousness.

In case of cardi-asthenia I always carry nitrite of amyl pearls with me whenever I give an anesthetic.

For short operations, such as curetting a uterus, removal of urethral caruncles, etc., that is, operations not exceeding fifteen minutes, the nitrous oxide gas answers very well as an anesthetic.

The recent innovation of etherization by the rectum has thus far proved too dangerous (chiefly through over-distention of the intestine, and colli-

quative diarrhea) to commend itself to my favor, even as a means of beginning the anesthesia.

If much pain is complained of after an operation, a hypodermic of five to eight minims of Magendie's solution of morphine is usually advisable.

THE OPERATION FOR LACERATION OF THE CERVIX UTERI.

The subject of the significance of this lesion, of the evils which it is claimed to entail, and the benefits which follow its repair by a plastic operation, has attracted so much attention among gynecologists during the past decade that I think it a duty to myself to supplement a previous article of mine (*American Journal of Obstetrics*, January, 1879), by a complete statement of my views on this question. In doing so I shall endeavor not only to describe the operation for this injury in its minutest details, but also to notice and discuss from the latest stand-point the various disputed questions of the indications for, and results of, this operation.

Definition.—By laceration, fissure, or rent of the cervix uteri, we understand a traumatic division of the lips of the intravaginal portion of the cervix of a greater or lesser degree, and involving all or a portion of the tissues of the part. Lacerations of the upper portion of the cervix, not involving the external os, are not included in the lesion now under consideration, being classed under the head of *rupture* of the parturient uterus.

Etiology.—As conveyed by the word "traumatic," in the foregoing definition, the agency which produces a laceration of the cervix is of a forcible character, and is represented by the presenting part of the child, usually its head. The rapid forcing of this presenting part through the, in such cases, as yet imperfectly dilated cervical canal and external os, is the cause, in the large proportion of instances, of the rent. Early rupture of the membranes before the cervix has become softened, dilated, and retracted over the presenting part; and, above all, unusually severe and protracted expulsive efforts of the uterus, by which the child is rapidly forced through the cervical canal and perhaps out of the vagina, bear the chief blame in the production of a lacerated cervix. A rigid os, faulty development of the cervix (conical, protrusion of one lip over the other), previous disease of the cervix, chiefly cicatricial induration and hyperplasia; malformation of the uterus (anteflexion), whereby the expulsive force during labor is directed more against one lip than the other; cystic disease of the cervix, rendering it brittle and friable; probably contraction of one or both broad ligaments, or adhesion of the cervix by previous cellulitic exudation, preventing equal dilatation of the lower segment of the uterus;—all these conditions doubtless also play a more or less important part in the causation of the injury under discussion.

That it can be produced by careless or unskilful use of instruments, especially the obstetric forceps, in rapidly extracting the head before the os is dilated, cannot be denied. Unquestionably, in a certain number of cases, the lesion owes its existence to this cause, and the operator is to

blame for its occurrence. But the number of lacerations produced by forceps is, I am confident, exceedingly small in proportion to the whole number of lacerations, and even to the number of forceps operations. Indeed, an experienced operator, by gently and gradually evolving the head and regulating its progress with the forceps, may even prevent a rupture, both of the cervix and the perineum.

Besides, the poorer classes, with whom this accident is certainly met with quite as frequently as in the rich, very generally employ midwives in their confinements, who, whatever other faults of commission and omission they may be guilty of, do not use forceps in delivering their patients.

One of the first impulses of a woman when she is informed that she has a torn cervix upon which many of her symptoms depend, is to blame her physician for not having prevented or repaired the injury at once, or, at least, for not having told her of it and of the necessity for future treatment. In conformity with justice and the actual facts, I have always strenuously insisted on the complete exoneration of the medical attendant at the confinement (even though it was a midwife) from all blame in the production, or failure of prevention, or immediate repair, of the injury (which I would probably not be as well justified in doing if the injury was to the perineum); but, feeling that I could not with equal propriety excuse the ignoring of the lesion, I have preferred to pass over that portion of the charge in silence. It will naturally and correctly be inferred that I consider it a wise practice to examine every woman immediately after confinement, in order to ascertain if the cervix or perineum has been lacerated, and, if the latter is found sufficiently torn, to sew it up at once; but if the cervix is the part injured, to make a later examination before discharging the patient (say in a month), in order to decide whether the rent requires further treatment, or normal involution has so reduced its extent as to render it insignificant. The latter will very frequently be found the case. The advice given by some obstetricians to sew cervical rents at once is, in my opinion, usually impracticable, on account of the difficulties attending such an operation immediately after labor.

I do not think that I go too far when I assert that *all* fissures of the cervix which give rise to symptoms or entail pathological changes in the pelvis, are the result of parturition. The instances where the cervix has remained fissured sufficiently to demand subsequent operative treatment, after its division by knife or scissors for dysmenorrhea or sterility, or in the removal of a fibroid tumor of the uterus, are so exceedingly rare as to merit no notice in this connection. It is a well-known clinical fact that a slit of a non-parturient cervix can with difficulty be prevented from closing, and that a repetition of the division is not unfrequently required. The statements of certain "conservative" gynecologists, that the followers of the modern operative school vie with each other in slitting cervices for sterility or dysmenorrhea, and then in sewing up these same slits, are, therefore, absurd and absolutely devoid of foundation, theoretically or in fact.

The absence of preparation of the lower uterine segment and cervix for

its normal function of dilatation at term, is the reason why laceration of the cervix is so liable to occur during premature deliveries, even as early as the second month, when one would hardly think the elastic ovum capable of producing such an injury. Unquestionable instances of this occurrence, however, after early abortions, have been observed by many gynecologists, and I have met with several such cases.

Since rigidity of the inferior uterine segment, tedious labor, and instrumental delivery are most likely to be present during a first confinement, it is as a result of the first labor that the larger proportion of lacerations occur. Manifestly, if the lesion is not discovered until after a woman has had several children, it is usually impossible to decide in which labor it occurred, since the mere recollections of a woman as to the severity of a confinement, perhaps years previously, are but meagre facts on which to base an assumption. And it is possible that a cervix, like occasionally a perineum, may escape unscathed through a first ordeal, and be torn at a subsequent labor. But the probability is always for the first delivery, and my case-books confirm this statement, there having been, in 612 lacerations in parous women, 146 primiparæ, and 310 others in whom the symptoms dated from their first child.

Pathology.—The first pathological result of a parturient laceration of the cervix, is subinvolution of the uterus, either of the cervix alone, or of the whole organ. As a rule, normal physiological involution of the sexual organs, and of all parts of the body involved in the function of parturition (except the breasts during lactation), is accomplished by the end of the second month after confinement. Various circumstances, which it is not in the province of this work to enter upon, may retard this physiological process of retrograde metamorphosis, among which laceration of the cervix stands pre-eminent. The uterus, instead of having after two months resumed, to all intents and purposes, its normal ante-pregnant shape, size, and histological condition, undergoes this process imperfectly; it is larger (not necessarily longer), heavier, its tissue more succulent because more hyperemic, its mucous lining pulpy and hypersecreting, and its peritoneal covering hyperesthetic. In course of time, this condition of subinvolution changes to hyperplasia, the succulent tissue becomes dense and hard, and the uterus anemic; the minute nerve-filaments terminating in every muscular fibre are compressed by the firm, dense areolar tissue, and the multitudinous neurotic affections grouped together under the term *hystero-neuroses*, make their appearance. The case has now entered on its chronic stage, which may last until the menopause puts an end to sexual activity.

Not only the uterus, but also its adnexa—ovaries, ligaments, and cellular tissue—respond to the retarding influence of the laceration of the cervix during involution. We thus have relaxed ligaments, congested ovaries, and edematous cellular tissue. And again, in course of time, the heavy uterus drags on the lax ligaments and a displacement occurs; the ovaries change their hyperemia to hyperplasia, and the slightest accidental impulse may light up an inflammatory process in the ovaries, the cellular tissue, or the pelvic peritoneum. Thus ovaritis and cellulitis are frequently

found in connection with (and probably depending on) the laceration. The cellulitis or peritonitis may have occurred immediately after the injury, and thus are probably to be explained those cases in which the rent extended into or through the vaginal vault, and the cervix is found bound down by cellulitic exudation or is drawn to one side by the contraction of the effused lymph. The distressing symptoms produced by these several pathological conditions must, of course, be included in the list of those following laceration of the cervix, as, indeed, they are frequently the only ones for which the patient seeks advice.

In addition to these changes in the uterus proper and its adnexa, the cervix undergoes certain alterations of almost equal importance. The lacerated lips become glazed over by cicatricial tissue, which occludes the orifices of the cervical glands, and occasions retention of their contents and a swelling of the cervix by the distended glands; the cicatrix also presses on the terminal nerve-filaments in the cervix, chiefly in the upper angle of the rent, and through communication with the sympathetic system produces reflex neuroses in the pelvis, down the thighs, along the back, and in different distant portions of the body. The relation between some of these neuroses and the laceration is so mysterious as to be inexplicable, and is not credited by many gynecologists; but numerous cases are on record in which the repair of the laceration by a plastic operation has secured a cure of the neuroses, and hence this relation would seem to have been proved in such instances. These neuroses may be either of a physical or mental character, from a simple neuralgia to a chorea or functional dementia.

Emmet claims that general anemia from defective innervation of the nutrient organs is one of the results of reflex neurosis from a lacerated cervix. He is positive in this statement, although most gynecologists have not yet accepted his view in all its bearings.

Whether the obstructed glands exert an irritating influence or not on the terminal cervical nerves, is a question to be considered. I incline to an affirmative view.

If the lacerated cervix does not cicatrize over, or only the angles of the rent heal, the remainder of the lips may undergo cystic or papillary hyperplasia, or both; the separated lips evert, the mucous membrane lining the cavity of the cervix is rolled out (a condition called ectropion), its epithelium is gradually rubbed off, and a hyperplasia of the cysts and papillæ of the exposed mucous membrane takes place. From this swollen, granulating surface oozes a profuse, glairy, discolored discharge, and slight traumatic hemorrhages are frequent. This hyperemic and hyperplastic condition often extends upward to and even beyond the internal os, and cervical and corporeal endometritis result, in the latter affection frequently attended by the formation of fungosities. In consequence we have menorrhagia, which may become so profuse as to endanger the life of the patient. Profuse menstruation may also occur merely from the subinvolution, when no fungosities are present.

The subinvolution and its ultimate consequences (among which retro-

displacement and descensus of the uterus and hyperplasia play the most important rôle), the cervical catarrh, the menorrhagia, the neuroses, the tendency to cellulitis—these are assuredly sufficiently grave conditions to give to laceration of the cervix a prominent place in the production of utero-pelvic disease. Fortunately, all these pathological results are seldom found in the same case.

There is one other possible ultimate result which merits mention through its gravity, when it happens to occur. It is the possible degeneration of the raw, hyperplastic, everted surface of the torn cervix into malignant disease, epithelioma. The cases are constantly multiplying, since Breisky and Emmet called attention to this occurrence, where in carcinoma of the cervix the original existence of a deep laceration can be recognized, and the inference of cause and effect is undeniable. I myself have observed several undoubted cases of this kind. In this fearful prospect, which if remote, is still possible, lies another reason why a laceration of the cervix should not be neglected when discovered in good season. How many cases of the "ulceration of the cervix" of our forefathers have thus

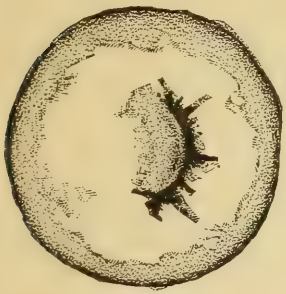


FIG. 233.—Normal Multiparous Os (P. F. M.). All cervix cuts are drawn as seen through a Sims' speculum with the patient on the left side.

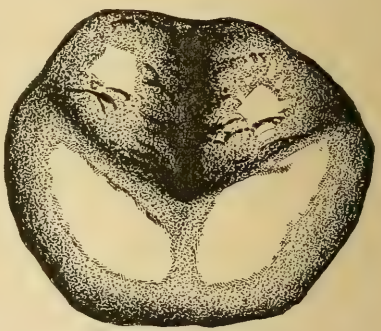


FIG. 234.—Right Unilateral Laceration of Cervix (P. F. M.).

been neglected, or cauterized for months, only to terminate ultimately in carcinoma, we can but conjecture, and rejoice in the possession of instruments and knowledge at the present day (thanks to Sims and Emmet) which permit us to diagnose and repair this injury before it is too late. When no eversion of the torn lips takes place, we may still have subinvolution, cervical catarrh, and reflex neuroses; but generally the local and general effects of the laceration are much less marked than when the lips are everted.

In a certain proportion of cases, laceration of the cervix produces neither subinvolution nor any of the results above described, and therefore requires no treatment. And it is equally true that subinvolution, ovaritis, chronic cellulitis, cystic and papillary hyperplasia of the cervical endometrium, endometritis, etc., may occur from other causes than a lacerated cervix. But occurring together with a laceration, it is generally fair to assume that they depend on it.

FREQUENCY.—The assertion may fairly be made and proved, that very

few women are confined at term without sustaining some injury to the cervix, be it ever so slight. It is the rare exception to examine a woman who has had a child and to find the lips of the external os entirely smooth without the slightest nick or fissure. And, as already stated, abortions even, frequently produce this lesion. As a rule, the conditions which predispose or cause the laceration obtain during the first labor, and hence we can generally attribute the accident to that delivery. The number of labors which a woman has had does not therefore specially influence the occurrence of a cervical rent, although each labor may enlarge the fissure and aggravate the ectropion and the other sequelæ. The lesion is therefore an exceedingly frequent one, and the degrees and varieties of it which come under observation for diagnosis and treatment are proportionally common. Emmet goes so far as to say that "at least one-half of

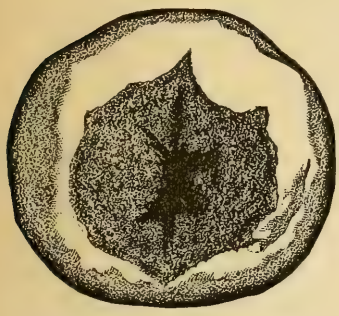


FIG. 235.—Bilateral Laceration of Cervix. First degree (P. F. M.).

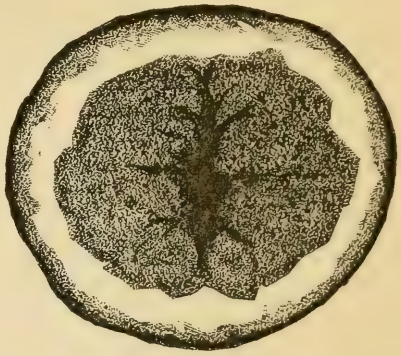


FIG. 236.—Bilateral Laceration of Cervix. Second degree (P. F. M.).

the ailments among those who have borne children are to be attributed to lacerations of the cervix." Pallen claims that forty per cent. of women with uterine disease have a lacerated cervix. Goodell states "that about one out of every six women suffering from uterine disease has an un-united laceration of the cervix," and other writers have arrived at an estimate varying between these figures. I found among 2,500 parous women (*i.e.*, those who had born one or more children), 612 cases of well-marked laceration of the cervix, or about 25 per cent. Of these only 280 were of sufficient depth to produce symptoms and require treatment; the proportion of deep rents, therefore, or of such as are likely to produce the pathological conditions already described, was less than fifty per cent. In the remainder the rents were either too shallow to be of any consequence, or they had filled out and cicatrized over and gave rise to no symptoms.

It will thus be seen that, while recognizing the frequency of the occurrence of this lesion during parturition, I esteem but a comparatively small proportion of all the cases of sufficient pathological importance to merit recognition as factors in the production of uterine disease.

VARIETIES AND DEGREES.—The parturient cervix uteri may be lacerated in one or several places and at any point of its circumference. The forms of laceration usually met with are the following: unilateral, bilateral, anterior,

posterior, stellate, multiple (Figs. 234 to 238). Of these the bilateral is the most common, the unilateral the next, and the stellate, multiple, posterior, and anterior, follow in the order named. The bilateral laceration (Figs. 235, 236, 237), as its name implies, takes place on either side of the cervix toward the lateral vaginal pouch; the unilateral (Fig. 234), may be

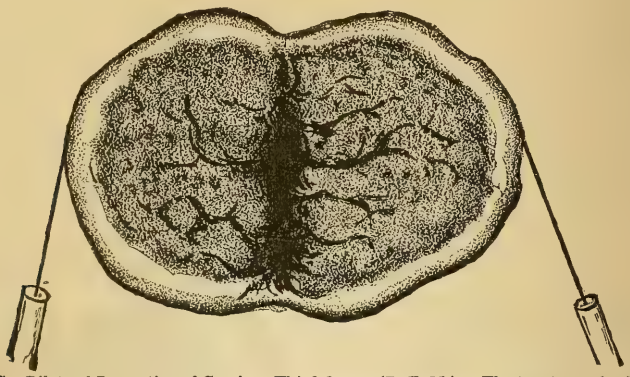


FIG. 237.—Bilateral Laceration of Cervix. Third degree (P. F. M.). The two tenacula show the direction of approximation of the everted lips.

either on the left or on the right side, more commonly, in my experience, on the left. The reason for this is, I think, correctly supposed to be the predominance of left occipito-anterior presentations, and the greater tendency to rupture by the broad unyielding occiput than by the comparatively small forehead and soft face. If these rents extended originally up to, or even into, the vaginal vault, very often a linear cicatrix is found leading for an inch or more away from the upper angle of the tear, and not unfrequently binding down or dragging on the cervix. At times, also, a distinct patch

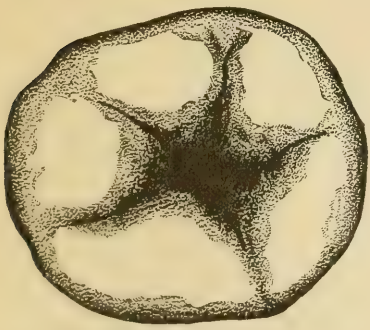


FIG. 238.—Stellate Laceration of Cervix (P. F. M.).

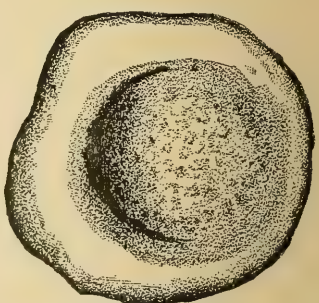


FIG. 239.—Laceration, First Degree, with large Cystic Degeneration of the Anterior Lip (P. F. M.).

of hard, plastic exudation is felt above the rent in the parametran cellular tissue, which was evidently caused by the same traumatic influence which produced the rent.

In the stellate laceration (Fig. 238) the fissures extend in a star-shaped direction from the lips of the external os; they may reach entirely to the

vaginal vault, but, as one might expect from the greater distribution of force on the cervical zone and more uniform yielding of the tissues, the rents are usually not so deep as in the lateral varieties.

The multiple laceration is characterized by numerous small, shallow nicks in the edges of the external os, which give the lips of the os an irregular, rough feel, but which generally produce no symptoms and require no treatment. I mention this variety merely for sake of completeness, not because it is therapeutically important.

The anterior and posterior lacerations resemble in appearance the lateral, with the exception that the lips of the rent are usually not so widely separated, owing to the comparative absence of traction on them by the uterine ligaments and the apposition of the lateral vaginal walls. I can recollect seeing but few anterior rents of any extent; of the posterior I have seen quite a number, some extending even into the posterior vaginal vault, the cervix being bound down by posterior adhesions.

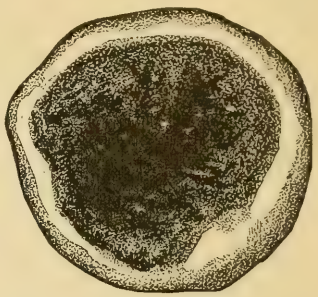


Fig. 240.—Concealed Fissures of Cervical Substance not involving External Os, but producing Patulousness of that Orifice (P. F. M.).

There is another form of laceration, which does not properly come under the head of fissure of the lips of the external os, since it consists merely in a sundering of certain circular muscular fibres of the upper portion of the cervix, and a laceration of the endotrachelian mucous membrane; the result of which is subinvolution of the whole part, whereby the external os is kept gaping and the cervical cavity is exposed to the air, if not to friction. The vaginal covering of the cervix is uninjured. The result of this exposure is to produce a cervical catarrh, which is exceedingly difficult of cure so long as the os continues to gape. This variety should be properly considered as a subinvolution of the cervix with paralysis of the circular fibres, produced by their hidden rupture (Fig. 240).

The relative frequency of these varieties and degrees of laceration is as follows: Among the 612 cases mentioned, there were bilateral, 340; unilateral, 120 (left, 80, right, 40); anterior, 7; posterior, 12; stellate, 11; remainder not noted. First degree, 272; second, 169; third, or worst, 171.

Pathological Changes in the Lacerated Cervix.—In addition to the mechanical lesion represented by the rent itself, certain pathological conditions in course of time develop on the torn surface or in the substance of the cervix, which frequently give rise to symptoms and require treatment not at all called for by the simple tear itself.

The first of these conditions, not in itself pathological but rather reparative, is the formation of a cicatrix over the torn surface. This effect of nature to repair the injury in very many cases meets with success; but in a not inconsiderable proportion nature appears to overdo her work and to supply a cicatrix more than necessarily thick and unyielding. The results of this is, that the contracting cicatricial tissue produces deformity

of the lips of the cervix; that the numerous glands in the cervix are closed and thereby become distended with mucus, and cause hypertrophy of the whole organ (so-called cystic hyperplasia); and finally, that the dense cicatricial substance, by compressing the terminal nerve-filaments, gives rise to multitudinous and diverse reflex neuroses in other parts of the body, from which the patient seeks relief. According to Emmet, it is chiefly the pressure in the upper angle of the rent by the so-called "cicatricial plug," which occasions these neuroses. Even in comparatively small rents, which of themselves would produce neither symptoms nor call for treatment, these "cicatricial plugs" are said to be at the "root of all evil" in the case.

A second complication is the rolling out (like a split celery stalk, as Goodell has it) of the lips of the torn cervix, which is caused partly by the natural tendency of the flaps of a divided elastic tube to separate when its circular fibres are cut, and chiefly by the traction exerted on either lip, anterior and posterior, by the attachments of the adjacent organs (vagina, bladder, rectum, and respective ligaments) to the part, when the patient is in the erect position. In the minor degrees of the lesion, the eversion, or ectropium, is but slight, and but a small portion of the cervical canal is rolled out and exposed; but when the rent extends to the vaginal junction and is bilateral, the whole cervical canal up to the internal os may be laid open and the tips of the everted lips may touch the anterior and posterior vaginal walls respectively.

If the eversion is unilateral the ectropium is usually much less, but I have seen, even in that case, the cervical canal laid bare above the vaginal insertion. In anterior and posterior rents there is usually very little eversion.

It must not be assumed that every cervical rent is covered by dense, unyielding cicatricial tissue, nor that eversion always takes place. Indeed, I have seen many cases where merely a fine film of vascular membrane covered the originally raw surfaces of the rent; and I have met with numerous instances of even the deepest fissures with no eversion whatever.

As a result of the fissure, the proper puerperal involution of the cervix does not take place; the cicatricial coating interferes with the normal discharge of mucus from the numerous cervical glands; in consequence of this and the chronic passive hyperemia of the part maintained by the irritation of the tear, there is a hyperplasia of all the elements of the cervix, and the whole part becomes decidedly, often enormously, enlarged. The exposed mucous membrane of the cervical canal becomes thickened, granulations spring up, and the glands develop into mucous polypi (Figs. 239, 241, and 242). By friction against the vaginal walls during walking, through coition, and the softening of the epithelium of the diseased part by the constant discharge, a raw, eroded surface soon forms, on which the swollen papillæ and distended follicles are clearly visible, and from this erosion oozes a profuse, serous fluid which mingles with the thick, glairy, discolored mucus discharged in abundance from the gaping cervical canal. The appearance of such a swollen, hyperemic, and eroded cervix, with its everted lips studded with papillary excrescences, may so closely resemble epitheli-

oma as to mislead the beginner, and even compel the experienced specialist to call the microscope to his aid in deciding between the two affections (Fig. 243).

Such an erosion should never be mistaken for an ulceration, as was done for many years, until Emmet recognized and described the true nature of the condition. An ulceration always implies a loss of substance, an excavation; an erosion, such as that described, on the lacerated cervix, is not only *not* an excavation, but very often there is an elevation, an actual increase of tissue through the hyperplasia above mentioned. So long as the parts retain their homogeneous character—I mean, so long as the sloughing peculiar to carcinoma does not replace the benign erosion of the laceration—so long an "ulceration" proper of the cervix is not found in this condition.

It will be readily understood that the various irritations to which the gaping cervical canal is exposed, soon develop a hypersecretion of that part, which increases as the glands become hyperplastic and the cervical endometrium is more and more rolled out. A profuse catarrhal endotrachelitis is therefore the natural accompaniment of many cases of cervical laceration, and often its only troublesome symptom. In a rather small proportion of cases, I think, the catarrh exists without ectropium of the cervical lining, and I am inclined to attribute the hypersecretion to a subinvolution of the cervical glands after the last confinement. Indeed, I believe this subinvolution, due in itself to the laceration, to be part cause of the chronic endotrachelitis in many cases, even before the subsequent cystic hyperplasia develops. I cannot divest myself of the opinion that laceration and cervical catarrh hold the relation toward each other of cause and effect, primarily at least, in spite of the view expressed by Schroeder and other prominent authors, that the tear occurs because the cervix is degenerated and softened by the hypersecretion. If the latter view were correct, laceration should be less frequent, for chronic catarrh of the cervix in the nullipara is not, in my experience, a very common disease.

Degrees.—In accordance with the depth of the laceration, we may distinguish three degrees of the lesion: the *first*, in which the rent extends only a short distance into the tissue of the cervix, say one-quarter of an inch (Fig. 235); the *second*, where the fissure reaches about half-way to the vaginal reflection (Fig. 236); and the *third*, or *worst degree*, where the cervix is torn up to, or even into, the vaginal vault (Fig. 237). This division is an arbitrary one, but seems to cover the majority of cases.

If the cervix is short, the length of the rent will naturally vary. Thus, a laceration of the third degree in a short cervix may appear very shallow, and equal only to one of the first or second degree in a long cervix. But the degree must be estimated by the depth of the rent, not by the length of the cervix.

The depth of the laceration will be apparently much increased if an eversion of the lips and ectropium of the cervical lining membrane is present. The bright red, or raw, everted surface gives an exaggerated appearance of the extent of the fissure, the true limits of which are easily recog-

nized by ascertaining the distance between the upper angle of the rent and the external os and vaginal vault respectively. The deeper the rent, the greater will be, as a rule, the eversion and ectropium, and the larger the raw, eroded surface exposed to view. It will thus appear evident that a lacerated cervix may often acquire a pathological importance chiefly in consequence of the eversion of its lips, and that it is this eversion rather than the rent itself which produces symptoms and calls for treatment.

Precisely the same statement applies to the condition which I have already described as hyperplasia of the papillæ and cysts of the cervix, when it complicates a laceration. The swollen papillæ and distended follicles produce an enlargement of the cervix, one lip usually predominating; in consequence, the torn lips are forced apart, and more of the hyperplastic endotrachelian mucous membrane appears to view than the size of the rent

FIG. 241.—Slight Bilateral Laceration, with Cystic Erosion of both Lips (P. F. M.).

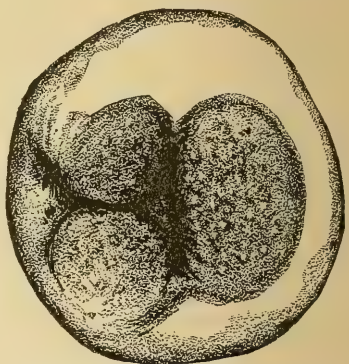


FIG. 242.—Posterior and Bilateral Laceration, with Cystic Hyperplasia (P. F. M.).

warrants, and the lesion thus appears magnified when, in fact, it is but one of the sequelæ of that lesion, the hyperplasia of the cervix, which gives it that appearance. The illustrations (Fig. 241, 242, and 243), compared to that depicting simple eversion without hyperplasia (Fig. 235), plainly show the effects of, and the difference between, these two conditions.

SYMPTOMS.—The physical signs which may be present as the result of a laceration of the cervix are either local or general, or both.

Local.—These are usually the more prominent, and first attract the attention of the patient to her sexual organs, and lead her to seek advice. Their nature may readily be imagined from the description already given of the pathological changes in the sexual organs following laceration, and I shall merely enumerate them, with brief comments, as occasion may require. They are the following: 1. Dull pain in the back (sacrum and lumbar region); 2. A sensation of weight, "bearing-down," dragging, in the pelvis; 3. Pain in the ovarian regions, hips, and thighs, of a darting, lancinating character; 4. Leucorrhea, chiefly of the cervico-uterine variety; 5. Menorrhagia; occasionally metrorrhagia, especially after coition; 6. Dyspareunia; 7. Sterility; 8. Habitual miscarriage.

The various sensations of weight, "bearing down," and dull pain, are

common to the majority of uterine diseases; the cervical leucorrhea may be present in nulliparæ, and the menorrhagia be due to chronic endometritis, fibroids, etc.; the metrorrhagia during coition may be produced by simple erosion, or by cancer of the cervix; the dyspareunia will also be found in chronic pelvic inflammation, prolapse of congested ovaries, etc., and the causes of sterility are too various to mention here; habitual miscarriage may be due to degeneration of the ovum or endometrium, or to constitutional causes. It is thus apparent that none of the above symptoms are pathognostic of laceration of the cervix uteri; but when several occur together that diagnosis may be plausible. Of course, it is unusual for all these symptoms to be found in one case, some being present in one, others in another case.

General.—The longer the laceration has existed, the greater its degree, and the more marked the local symptoms above described, the more will the general health of the patient be affected. The long-continued suffering, the drain of albuminous matter through the profuse cervico-uterine leucorrhea, the menorrhagia, and perhaps repeated abortions, all gradually bring on a most decided state of anemia, in consequence of which digestion suffers, and the patient ultimately becomes a chronic invalid.

The mode of production of general anemia through these agencies is sufficiently obvious not to require further explanation. But there is a theory, of which Emmet is the originator and chief advocate, for this anemia, which is less self-evident and plausible, and is not as yet generally adopted. Emmet claims to have seen patients in which the "cicatricial plug" was particularly well developed, with severe anemia, recover from their anemia and regain their health after excision of the plug and union of the rent by sutures. His theory, deduced from these cases and, he thinks, proved by them, is that a reflex neurosis from the terminal nerve filaments, compressed in the cicatrix, is distributed through all the nerves in charge of nutrition, disturbing their functions and impoverishing the blood. And this entirely independently of the depressing effect of the various reflex neuralgiæ, which certainly seem to depend on the cervical lesion. The opinion of so experienced a gynecologist, and keen and reliable observer, as Emmet, merits careful consideration, respectful attention, and conditional acceptance, subject to disproval by positive facts. Hence we have no right to scoff at this theory, however strange it may seem, that so slight a pathological factor as an apparently quite harmless scar in an otherwise almost insignificant tear of the neck of the womb, should be capable of producing such wide-spread constitutional disturbance. When a scar may be the starting-point of tetanus, we cannot deny the possibility of a reflex disturbance of the general nervous system from so slight a focus as an old scar on the cervix uteri. That this view of Emmet exercises an important influence on the significance of a laceration and on the indications for its repair, is evident. A believer in this theory must attribute symptoms to, and advise operative treatment of, a perfectly healed laceration, in which no other evidence of the lesion is apparent but the

groove separating the torn lips, neither hyperplasia nor erosion of the lips, nor cervical leucorrhea being present; while to the majority of physicians such a state of the cervix would seem utterly incapable of producing local or general pathological symptoms of any kind whatever, and consequently would require no treatment.

While I have not met with cases which to my mind positively proved the correctness of Emmet's theory, I have seen several instances of reflex neuroses affecting other functions and organs than those of nutrition, clearly dependent on a perfectly cicatrized cervical rent. In one case a lady had had one child eighteen years previously; since then she had suffered from violent attacks of hemicrania coming on always at the menstrual period, and also at irregular intervals on any excitement. She also had a sciatic neuralgia on the right side. Uterine treatment by a now deceased well-known gynecologist, directed, as the lady said, to the healing of an "ulceration" of the neck of the womb, failed to relieve the migraine. Still for years there had been no symptoms pointing to uterine disease, except sterility, she never having conceived again. An examination revealed a perfectly healed bilateral laceration of the cervix of the third degree, with rather well-marked cicatrix, the cervix being slightly attached by an old adhesion to the right side. Firm pressure on the cicatrix in the upper angle of the right fissure at once produced the sciatica on that side.

For the purpose of trying the influence on the hemicrania of counter-irritation by tincture of iodine to the cervix, I made several such applications with the result of bringing on a violent attack of hemicrania. With a sedative object in view, I applied the negative pole of a galvanic battery by a small button to the right side of the cervix, and the other over the abdomen and right hip, using six to twelve cells for about half an hour. As a result of about twenty of these sittings, the next menstrual period was attended by only a very slight attack of hemicrania, the next by none at all, and after three months of treatment, during which there had not been a single attack (for eighteen years she had had at least two or three every month), I first gradually diminished and then ceased the galvanic treatment, and finally, in order to secure a permanent result, excised the whole cicatrix from both sides of the cervical rent, sewed it up, and obtained perfect union. Since then, nearly three years, the lady has been free from migraine. In this case the result of the local treatment (applied directly to the spot whence the sciatic neuralgia seemed to spring) and of the excision of the cicatrix, leave me no room to doubt the relation of cause and effect between the cicatrix and the far distant frontal neuralgia.

In another instance a woman, mother of one child, was brought to me by her husband for the peculiar reason that at every coition she would go into a deep sleep, from which she could be roused with difficulty. As this phenomenon was both surprising and disagreeable to the husband, he asked for advice. An examination with the finger discovered a deep bilateral laceration with considerable eversion. Receiving no answer to my question, whether firm pressure in the angles of the rent gave rise to pain, I looked at her face, and found her fast asleep with eyes closed and regular

respiration. Neither speaking to her nor vigorous shaking could arouse her. I bethought myself of Charcot's expedient for hysterical paroxysms, and pressing my fingers deep into the left ovarian region, succeeded in eliciting a groan, and then making pressure on the right side also, the patient opened her eyes and sat up. She was utterly unconscious of what had occurred. A repetition of the examination was attended by a return of the sleep (which resembled catalepsy), and the examination was concluded in this state. An excision of both cicatricial plugs and union of the lips resulted in a cure, of the permanence of which the husband assured me, and of which I satisfied myself, so far as a digital examination was concerned.

In a case of hemichorea with retroversion and a lacerated cervix, I operated for Dr. E. C. Seguin, who had vainly tried every means at his command to cure the chorea. I gave no special hope of relief by the operation, because I could not discover any relation between the tear and the neurosis. Still, it being the only pathological condition discernible, and replacement of the uterus and a pessary having failed to improve her, we concluded to try this last resort. For some months after the operation there was a very slight improvement; but, soon after her return home, the patient conceived, the chorea rapidly disappeared; she went to term and was safely delivered, and is now entirely well, with no return of the chorea.

Dr. R. Stansbury Sutton, of Pittsburg, Pa., reports a case ("American Gynecological Transactions," vol. vi., 1881) of cataleptiform trance produced by a lacerated cervix, and cured by the repair of the latter.

Now, if neuroses of the kind described in the first two cases of mine and that of Dr. Sutton (my chorea case I will exclude, as the possible curative influence of pregnancy must be admitted) can depend on reflex irritation from an old cicatrized cervical laceration, and be permanently relieved by the removal of the irritant tissue and repair of the rent, who will deny the possibility of a neurosis in any portion of the body being due to the same cause, or the existence of the indication for the same treatment? I do not believe that such cases are common, but should, still, on the strength of those related, incline to look upon certain neuroses in women, no matter how distant from the pelvis, as possibly symptoms of some uterine disease, which might be a cervical laceration, or a displacement, or something else; and such neuroses, if occurring at the menstrual period, would probably induce me to request a vaginal examination.

Diagnosis.—While the existence of a laceration of the cervix may be suspected from the objective symptoms above described, a positive diagnosis can only be made by a physical examination, which may be conducted in either of the two usual ways, by the touch, or by the eye through a speculum, either of which will ordinarily suffice for a diagnosis. As a rule it is wise to make use of both methods, and to supplement the touch by the speculum.

By the Touch.—A finger familiar with the appearance or feel of a normal cervix will readily detect the presence of a laceration. Even the tyro cannot fail to recognize the difference between the smooth, conoid body which

his reading has taught him to represent the normal cervix, and the irregular, notched projection which his finger encounters as it approaches the upper portion of the vagina. In accordance with the variety of the laceration, the finger finds one or two lateral fissures, or an anterior or posterior one, varying in depth according to the degree of the tear. The torn lips of the cervix may be more or less separated and hyperplastic. If the rent is of the third degree and the lips are completely everted, the finger will at once enter a shallow cavity in the centre, which is bounded on all sides, but chiefly laterally, by a soft, velvety, or slightly granular-feeling surface, which terminates in a rather sharp border, the edge of the normal os and the beginning of the vaginal mucous membrane covering the outside of the cervix. In extreme cases the cervix feels like a mushroom filling the vaginal vault, and the examining finger may have some difficulty in reaching the limits of the expanded lips, chiefly the posterior, which in such cases extends as far back as the posterior vaginal wall. This eversion naturally destroys the normal conicity of the cervix and, in aggravated cases, the sulcus between the cervix and vaginal vault may be entirely obliterated, and the surface of the vagina and the everted lip form one continuous line.

The finger can occasionally feel the dense cicatrix in the upper angle of the rent, and firm pressure there will often cause local and radiating pain to the ovaries and other parts of the pelvis, sometimes even down the thighs. If the everted lips are eroded, a digital examination usually provokes a discharge of blood, generally mixed with viscid mucus from the gaping cavity.

Through the Speculum.—If a lacerated cervix is exposed through a cylindrical speculum, the lumen of the instrument will be occupied by a bright-red, raw-looking, perhaps bleeding mass, which more or less fills the speculum according to the diameter of the tube and the cervix, and the depth of the rent. In itself this raw surface gives no evidence of its true character, or that it is the result of a laceration of the cervix. The eye perceives a mass resembling a peeled ripe tomato, or very ripe strawberry, filling the lumen of the speculum; friction with cotton on the dressing-forceps generally draws blood, and the natural inference is that this is what our predecessors confidingly called it, an "ulcerated" cervix. Indeed, I doubt not that the "ulceration of the os" of the past generation was in by far the larger majority of cases nothing but a lacerated cervix with everted and eroded lips. They saw it only through a tubular speculum, an instrument which, by its circular upward pressure when inserted to its full length, necessarily separates the torn lips and increases the erosion, thereby changing a comparatively small rent to one with disproportionate ectropium of endotrachelian mucous membrane; they failed to notice the edges of the cervical lips and to understand the true relation of this raw surface, which was not cervix at all, but cervical canal, and they pronounced the case one of "ulceration" and treated it accordingly. We can hardly blame them, since those practitioners at the present day who still use only the cylindrical speculum, cannot but fall into the same error of

diagnosis. Indeed, it would be almost impossible, even for the experienced modern gynecologist, who is perfectly familiar with the peculiar appearance of a lacerated and everted cervix, to diagnose this condition with positive certainty through a tubular speculum.

The bivalve speculum is far superior to the tubular in affording, by the wider separation of its branches, a more complete view of the cervix and the vaginal vault. It possesses in a minor degree the disadvantage of separating the torn lips and exaggerating the degree of laceration. But it allows the sound borders of these lips to be seen, and thus enables the experienced eye to recognize the true state of affairs, and the relations which these lips hold to each other. The novice, however, or the practitioner familiar only with the tubular speculum, will probably still fail to make the correct diagnosis, and will see only a large "ulcerated" cervix.

The Sims speculum is really the only form of instrument through which this lesion can be properly diagnosed and its extent and significance appreciated, as well as its surgical cure carried out. It is true that many German gynecologists prefer and succeed very well with Simon's complicated set of vaginal depressors, using them, as they must be used, in the dorsal position. But this method requires more assistance in managing the specula, and affords, it seems to me, less space between the thighs for the operator's hands. At all events, we in this country are so used to Sims' speculum and position, and feel so well satisfied with it, that we do not care to exchange it for another.

The Sims not only affords the fullest possible exposure of cervix and vagina, but it also permits the cervix to be managed with instruments in every manner necessary for diagnosis and treatment. Now, how is this diagnosis made? The patient being placed in Sims' position, the speculum is inserted, and the cervix laid freely bare. The anterior vaginal wall is thoroughly pressed down by the depressor, and the largest separation of the torn lips is thus obtained. The appearance of the three degrees of laceration is well shown in Figs. 235, 236, and 237, drawings of which were taken through Sims' speculum. The depth of the rent, as shown by the relation of its upper angle to the vaginal mucous membrane, where it is reflected from the vaginal vault to the cervix, is now ascertained by hooking a tenaculum into the outer border of each lip, or each side of the fissure (Fig. 237), and approximating them gently until all the raw, deep-red cervical lining is rolled in, the lips are reinverted, and only a groove in the pale-pink surface marks the seat and extent of the laceration. The normal form and dimension of the cervix is thus re-established, and a safe guide given for the operator in marking out his field for the permanent restoration of the part.

It is this approximation of the torn and separated lips, and the momentary restoration of the integrity of the cervix, which is possible only through a speculum affording the freedom of movement for uterus and hands given by the Sims.

This maneuvre is useful in another respect besides enabling us to determine the depth of the rent: it also shows us the mobility of the uterus

and of the separated lips, and whether they can be approximated so as to simulate health. If this is not the case, an essential factor is wanting for an operative cure.

Any diminution in the normal mobility of the uterus, as shown by traction on the cervix in various directions with the tenaculum, would probably counter-indicate (at least for a time) operative treatment. In addition to the mobility of the separated lips and of the whole uterus, the amount of erosion and of hyperplasia (cystic and papillary) of the cervix, and of discharge from the cervical canal, should be ascertained through the speculum, as these conditions are of great importance in deciding on treatment, duration, and prognosis.

If in any case there should be doubt as to whether there is a laceration with highly everted lips and an eroded, ectropionized, endotrachelian lining, or whether the case is merely one of erosion of a flat, short cervix, the possibility of drawing together the edges of the eroded surface with tenacula hooked into each side will at once conclusively decide in favor of a laceration. While it is possible to draw the loose mucous membrane of the vagina by main force over a central erosion of the cervix, and thus simulate the maneuvre described above as characteristic of a laceration, it is not possible in such a case to approximate the sides of a cervix which have never been separated, and that is what is done in laceration. An error can, therefore, be made only through carelessness.

While it is easy to make a diagnosis of laceration by the touch or the speculum alone, it is always advisable to make use of both methods, and to follow the touch by the Sims. By the touch, chiefly, can we ascertain the mobility of the uterus, and the condition, as regards previous inflammatory processes, of the pelvic cellular tissue and peritoneum and the ovaries. Besides, the touch will generally give a better, more correct idea of the depth of the fissure, since the necessary expansion of the vagina by air during a Sims examination often obliterates somewhat the depth of the rent. I have frequently been surprised to see a rent, which, by the touch, appeared very deep, look quite shallow through the Sims. But the approximation of the lips with tenacula will always reveal the precise state of affairs. But I admit that more than once, after having, by the touch, pronounced a cervix sufficiently torn to demand operation, I have been compelled to reverse my decision on seeing how comparatively small the rent appeared and how healthy the tissues looked through the speculum. This discrepancy was probably due greatly to the deepening of the fissure by the pressure of the examining finger.

One other advantage of always making a specular examination in addition is, that the exact site of the original external os and the direction and dimension of the cervical canal can be accurately mapped out, information which is but very superficially conveyed by the touch or the sound. This point is of supreme importance during the plastic operation for repair of the cervix.

If the fissure is unilateral, the original seat of the external os will not be the spot where the rent appears the largest or where the cervical canal

gapes, but the lowest tip of the cervix. A glance at Fig. 234 will explain this statement. In a bilateral laceration of equal degree on both sides, the external os will always be located at the extreme central tip of the everted lips.

Differential Diagnosis.—I have already referred to the prevalent error in the past, and perhaps still, among some older practitioners, that the numerous cases of a raw, bleeding, or freely secreting cervix, are instances of "ulceration" of that part. This error was excusable before the discovery of the true character of this apparent ulcer. But now, when the teachings of Emmet and his followers have made plain to every intelligent and unprejudiced mind that, in the large majority of instances, a lesion of parturition, a laceration of the neck of the womb, underlies this so-called ulcer; when, by the finger or through a Sims speculum, the correctness of this assertion can be easily and infallibly demonstrated, nothing but absolute voluntary blindness can account for a failure to accept this fact. An ulcer implies a loss of substance, which is not necessarily present in a lacerated cervix. Of course, a sloughing of a portion of the cervix may take place, and thus an ulcer be formed; but this is an addition to the original lesion, not a usual feature. The laceration is merely a severing of the cervical tissues, which can be restored to their integrity by a simple re-attachment of their vivified edges. Instead of there being a loss of tissue in cervical lacerations, there is, generally, the reverse, the papillary and follicular hyperplasia increasing the size of the whole cervix and raising the eroded surface above the surrounding tissue. If this hyperplasia is excessive, the cervix may be covered with a mass of fungous granulations (Fig. 243), and the differential diagnosis between this benign affection, called cystic hyperplasia, and epithelioma, be possible only by the microscope. Several such cases have come under my notice, one which the accompanying cut represents, another recently sent me by the family physician as epithelioma, in which the removal of the fungoid masses with scissors and union by sutures of the opposing edges of mucous membrane, resulted in a permanent cure.

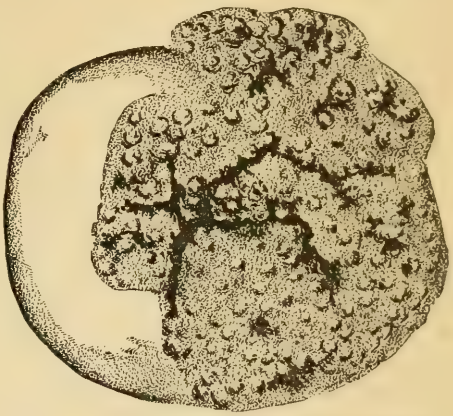


FIG. 243.—Cystic and Papillary Hyperplasia Simulating Epithelioma (P. F. M.).

I may mention that I have seen at least one similar case in a nullipara, the excrescence from the lips of the cervix resembling very much a cock's comb (the cock's comb granulation of Evory Kennedy, "Hahnenkammgeschwür" of the Germans), which was cured by excision and cauterization with nitric acid. The condition which, by its raw, eroded appearance, may simulate an ectropium accompanying laceration, is a simple erosion of the vaginal covering of the cervix, with or without an eversion

of the swollen, puffy endotrachelian mucosa through the gaping os. This condition occurs more frequently in virgins and nulliparæ than in parous women, and is generally the result of, and accompanied by, a chronic catarrh of the cervix. The constant viscid and somewhat acrid discharge from the cervical canal softens the epithelium covering the cervix, friction against the vaginal walls or coition removes the softened epithelium, and a raw surface appears, which discharges freely and bleeds on touch. Soon this raw surface becomes dotted with small elevations, the swollen papillæ, and is now a "granular" erosion; or yellow, translucent spots appear on it here and there, some elevated, others flat, and we have the "follicular" erosion. This erosion may occupy only one lip of the cervix, generally the one over which the discharge flows in the existing position of the uterus (if normal, the anterior), or, which is most rubbed against the vaginal wall (generally the posterior); or the erosion may be circular, and is then continuous with the puffy mucous lining of the cervical canal. But here we have no fissure and no loss of substance. It is neither a laceration nor an "ulcer," but merely an *erosion*, and the differential diagnosis is readily made by a digital and specular examination and a remembrance of the distinctive features of each condition (see Figs. 100, 101, 102).

It may be permissible to mention here that there are but four varieties of true "ulcer" found on the cervix uteri: the cancerous, the syphilitic, the varicose (rare), and that produced by friction of a prolapsed uterus. In all of these there is actual loss of substance.

A peculiar congenital malformation of the cervix uteri has been observed by Fischl, of Prague, in a still-born infant, and I have since seen one case in a virgin of sixteen years: The cervix presents a distinct bilateral cleft, with separation of the lips simulating so closely a laceration that, in my case, only the presence of a tense hymen could convince me that it was not a puerperal lesion. An examination made with the smallest Sims speculum showed a broad, eroded cervix, the lips of which could be approximated by tenacula very much as in true laceration. The importance of recollecting the possibility of a congenital malformation simulating a puerperal laceration of the cervix, in a case of a supposed nullipara where the hymen happened to be absent, should not be overlooked, especially as a very distinct and well-marked laceration may be produced by an abortion even as early as the second month, which would not leave the usual traces of full-term delivery on the external genitals.

Evil Results of Laceration.—The majority of the pathological conditions induced by laceration of the cervix have already been described under Pathology, and I will merely re-enumerate them: Subinvolution of the cervix or the whole uterus; cervical and corporeal endometritis; papillary and cystic hyperplasia of the cervix; uterine fungosities; menorrhagia; uterine displacements; chronic peri-uterine cellulitis and peritonitis; neuralgia of cervix; chronic ovaritis; epithelioma. But there are two other conditions which, coming into play only at certain times, have not yet been described. I mean the incapacity for conception, or absolute sterility; and its converse, the tendency to abortion, or virtual sterility.

It is a curious fact at first sight that these two conditions, sterility and the possibility of conception (if not of retention of the ovum), should result from the same pathological process. On the one hand the laceration forbids conception, on the other it permits it, or even facilitates it by means of the unusual gaping of the cervical canal. But the explanation is easy when we consider the subsequent changes in the cervical cavity and their consequences. The thick, semi-purulent mucus discharged by the hyperplastic glands in the cervical canal virtually plugs the passage and prevents the entrance of the spermatozoa, or washes them away if they have succeeded in gaining a foothold. Besides, the purulent corporeal secretion may interfere with their vitality, and the hyperplastic endometrium may oppose a mechanical barrier to the upward progress of the spermatozoa, or afford a poor soil for the nidation of the ovum. But, granting that the cervical canal is found free from mucus, as no doubt often happens, and the other obstacles fail, conception takes place, the ovum develops, and gradually expands the cavity of the corpus uteri. The absolute sterility has been overcome and the woman is pregnant! Now steps in the laceration again as a destroyer of her hopes. As the uterine cavity proper expands, the organ assumes a spherical shape, with a short, broad, flattened cervix attached to its lower segment; the cervical canal is practically effaced, the internal os, in lacerations of the third degree, is immediately continuous with and contiguous to the vaginal tube, and its tissues are therefore directly exposed to the irritation of friction against the vaginal walls, and the injury so liable to be inflicted by coition. The result of these factors is that the internal os gradually opens, a slight hemorrhage from the endometrium takes place, uterine contraction sets in, and the ovum is expelled. This train of events may occur again and again, with each succeeding miscarriage the patient becoming more and more an invalid and less capable of reproduction.

While these results frequently follow lacerations, there are numerous instances where women with large rents not only conceive readily but carry their children to term, are easily delivered, and make good recoveries. These seeming contradictions belong as yet to the mysteries of nature, together with many of the hidden causes of sterility, the determination of the sex, etc.

Another condition which is frequently present as a result of laceration, is dyspareunia, the reason for which will be readily attributed to the various pathological changes in the parts already described. Painful coition will naturally increase the chances against conception, since that act will probably be less frequently and less perfectly performed.

Prognosis.—Untreated, many cases of laceration gradually cicatrize over, and when the patient arrives at the menopause and sexual activity ceases, the uterus and ovaries atrophy, and the symptoms which the patient has borne so many years diminish and ultimately disappear. The same atrophy may take place at the menopause even when the lacerated cervix has remained raw, and the shrinking of the cervix may bring about the healing of the erosion. But often the latter may persist for years after the climac-

teric and annoy the woman by the discharge. Very commonly the hyperemia maintained by a deep laceration with eversion and erosion will prolong the menstrual flow, and if hyperplastic endometritis has followed the lesion, the menopause may be postponed several years, and not come on until the morbid condition has been removed by appropriate treatment. I have thus seen menstruation continue, to a profuse degree even, beyond the fiftieth year, and require curetting of the endometrium and repair of the laceration before it could be arrested and the menopause inaugurated. Thus even the usual period for this physiological event may not suffice to check the evil results of the lesion, and the suffering may be prolonged even beyond the time for sexual rest. It is certain, if the laceration occurs early in reproductive life and its degree and symptoms are marked, that the latter are more than likely to continue without marked abatement until the time for the menopause arrives, unless at least palliative treatment is employed. This is the prospect which a conscientious and experienced physician must offer to a patient who asks him what her chances are if the condition is not treated in any way. And he has no right to conceal the possibility of an eventual malignant degeneration of the cervix.

It is quite true, however, that palliative treatment by caustics and astringents, by hot injections and glycerine tampons, will after a while produce at least temporary relief, and I have seen cases, which at first sight seemed imperatively to demand an operation, improve so much after several months of the above treatment as to oblige me to alter my previously expressed opinion and pronounce the operation now unnecessary. But we should not forget that such relief is more than likely to be merely temporary, and that the symptoms may soon return in all their original intensity.

There can be no question, so far as my experience goes, that a woman with a large ununited laceration of the cervix, which produces the majority of the symptoms already enumerated, remains more or less an invalid so long as the rent is not radically cured by operation, or until the menopause atrophies her sexual organs in the natural order of events. Let those who scoff at the importance of intelligently and thoroughly treating this lesion, read and reflect!

That many women spontaneously recover from the laceration, or seem little affected by its persistence, or conceive and bear children easily and naturally, and never even know that they have such an injury, is merely an example of the old saying, that "the exception proves the rule."

Significance.—The existence of rents of the cervix as the result of parturition was known many years ago; Sir James Simpson speaks of them in 1851; Gardner, of New York, in his book on "Sterility" (1856), gives illustrations of the lesion, and attributes to it "ulceration" of the cervix, catarrh, sterility, and abortion; and Professor Roser, of Marburg, in 1861, wrote of it under the name of "cervical ectropium." Pallen, of St. Louis, in 1867, even sewed with silver wire a deep fissure of the cervix immediately after its occurrence (St. Louis *Medical Journal*, May, 1868). But with these few authors the history of the lesion is complete until 1869, when Thomas Addis Emmet first published (*American Journal of Obstetrics*, Feb-

ruary, 1869) the results of his experience of a series of years, and promulgated what was destined to be one of the greatest medical achievements of the century. He it was who first recognized the pathological significance, as a prime factor in the production of uterine disease, of this hitherto almost unnoticed injury. He it was who pointed out that many local and even distant symptoms depend on this affection and its various sequelæ; and by demonstrating how the raw surface of the old "ulceration" could be rolled into the cervical canal and made to disappear by simply approximating the outer edges of the raw surface, at once showed the character of the "ulcer" and the method of curing it. On this recognition of the true character of the condition depends the discovery of the radical operation for its cure, now universally known by the name of its inventor.

Since then, the operation has become, one might say, almost fashionable, and numerous operators have added their names to the small list of writers who preceded Emmet. While many of these contributions were mere reports of operations without any scientific value, a fair number of exceedingly valuable articles have been written, partly on the pathology of the lesion in its later stages (Ruge and Veit, Olshausen, Rokitansky, Breisky), partly on its results and treatment (Goodell, Spiegelberg, Nieberding, Van de Warker, Wylie, Kaltenbach, Lee, Mundé, Schroeder), and the American text-books and several English and German works have included the subject among the accepted diseases of the uterus. Of the American books, Emmet and Thomas; of the English, Hart and Barbour; of the German, Hegar and Kaltenbach, have each devoted chapters to the subject. The French seem as yet not to have made up their minds whether the lesion is worthy of their notice, for the author of their best text-book, Courty, has omitted all mention of it in his last edition (1883). It is true, a graduation thesis was written on it by Desvernine, of Paris, in 1879, but it was merely a very imperfect compilation of the articles of previous authors.

The significance of cervical laceration as a factor of uterine disease is now universally accepted by advanced gynecologists all over the world. Here and there, some of our conservative brethren of the older school of "medical gynecology" still hold aloof and affect to doubt the great importance of this lesion and the necessity for its operative cure; but they are in the minority, and as the excessive zeal in favor of the operation gradually abates, and it is confined to proper limits, I doubt not that its opponents will admit its necessity and join the majority. We seem in a fair way to reach this point, at the present day.

There is no question that the importance of the lesion has been greatly exaggerated in the past few years, so that *every* laceration, no matter how trivial, was at once suspected of dire consequences and was accused of being the author of all sorts of mysterious symptoms. And, naturally, the operation was proportionately overdone. But calmer judgment has led us to select our cases more carefully, and those of us nowadays who try to treat our patients intelligently and conscientiously and to avoid "hobbies," so far as our lights allow, have come to the conclusion, as a re-

sult of experience and deliberation, that *the significance of a cervical rent as a cause of uterine disease lies not in the existence of the rent itself, but solely in the symptoms which it produces, and in the direct influence which can be traced to it as the prime factor in the production or maintenance of some pathological condition or functional derangement in the pelvic organs or elsewhere in the body.*

What special conditions of, or changes in, the cervix produce such pathological results, whether it be the "cicatricial plug" or the hyperplasia, cystic or papillary, of the cervix, or the cervical catarrh, or the eversion and erosion of the lips, that, the gynecologist must seek to determine in each individual case, and according to his conclusion decide as to the special significance of the rent, and the necessity for its treatment. But if careful examination fails to trace any relation between the cervical lesion and the objective signs, common-sense will lead us to seek elsewhere than in the cervix for the primary cause.

Thus it may happen (although rarely) that a deep laceration, with all the tissue-changes in the cervix described under Varieties, produces no local or general symptoms whatever; and, on the other hand, that to a comparatively shallow, cicatrized fissure, can be clearly traced an ovarian, sciatic, or supra-orbital neuralgia. It is the presence of this relation between cause and effect, then, which constitutes the significance of the cervical lesion, not its mere existence. If this relation be borne in mind, haphazard diagnoses and unnecessary operations will not be made.

For the detailed description of the complications which may give significance to an otherwise trivial rent, I refer the reader to the section on Varieties and Degrees of Laceration.

From my experience, which now extends over twelve years since I first saw Emmet operate for this lesion, and comprises a material of six hundred and twelve carefully recorded cases of appreciable lacerations of all degrees, I have come to the general conclusion that, of all the women who have a lacerated cervix during confinement, one-half, or fifty per cent., suffer no inconvenience whatever from the injury, either because it was slight, healed spontaneously, or because involution was so complete as to reduce the originally deep rent to a comparatively trivial nick.

Of the remaining fifty per cent., one-half (or twenty-five per cent. of the whole number) for a time present some of the symptoms already described, then gradually recover spontaneously, or require palliative local treatment before they are relieved and the injury is reduced to a dormant state; of the still remaining twenty-five per cent., one-half *may* be curable (that is, may be relieved of their symptoms) by appropriate palliative treatment, but will eventually require the radical operation for a permanent cure; and the last half, or twelve and a half per cent. of the whole number, are absolutely incurable otherwise than by the radical operation.

It thus appears that I consider only one-half of all the lacerations of the cervix which occur as producing and requiring treatment of any kind, and of these but one-quarter, or one-eighth of *all* lacerations, as absolutely requiring Emmet's operation. Surely I cannot be reproached with being

an advocate either of too universal pathological significance, or of unconditional operative treatment, of this lesion.

Indications for Local Treatment.—The indications calling for local treatment of any kind to a lacerated cervix are regulated entirely by the significance of the lesion as shown by the symptoms directly depending on it. Such symptoms may be rational or objective, and may depend on any or all of the pathological conditions following the injury, which have already been described. As a general and safe rule, it may be assumed that any of the tissue-changes described as occurring in the cervix after a laceration (erosion, cervical catarrh, cystic and papillary hyperplasia, passive congestion) produce symptoms of sufficient importance to require treatment; and the same applies to the "cicatricial plug," if a reflex neurosis can be traced to it.

Treatment.—The nature, frequency, and duration of the treatment depend on the depth of the rent, on the complications which may or may not attend it, on the absence of counter-indications to certain therapeutic measures, and on the toleration of the patient. Accordingly, as it is intended merely to relieve symptoms and secure temporary benefit, or a permanent cure is desired, it will be palliative or radical.

Palliative Treatment.—By palliative treatment are understood all the remedies which tend to relieve the local pathological conditions in the cervix, always excepting the laceration itself. Thus, by it the hyperemia of the cervix is diminished, the cervical catarrh is cured or held under control, the cystic and papillary hyperplasia and the erosion of the everted lips are cured, the cicatrix is softened and reduced, and thereby the reflex neuroses are relieved; and secondarily, the subinvolution and hyperplasia of the whole uterus, the chronic ovarian congestion, and pelvic cellulitis and lymphangitis, are all benefited and, perhaps, entirely cured. And in addition, the displacement of the uterus, the relaxation and prolapse of the vaginal wall, and the chronic vaginal leucorrhea, are relieved. Who can say, then, that palliative treatment, which does all this, is useless? But, admitting all this benefit, we must still recognize the undoubted fact that no palliative treatment will heal the laceration and restore the cervix to its pre-puerperal integrity, and that, so long as the rent exists, all improvement is usually but temporary.

The remedial applications usually employed in the course of this palliative treatment are the following:

1. Passive, chronic hyperemia of the cervix and pelvic organs is treated by daily injections of *hot* water into the vagina, in the recumbent position, according to the rules given in the section on Medicinal Applications to the Vagina. Further, by occasional scarification of the cervix, about once a week; by painting it with simple tincture of iodine twice a week, and by inserting, after each application, or oftener, one or more tampons soaked in a solution of alum or tannin in glycerine, which are to be retained until the next morning, their removal being followed by a hot vaginal douche.

2. The cervical catarrh will probably require the removal of the hyper-

plastic glands by the sharp curette before benefit can be expected from a caustic or alterative application. In very severe cases, the pure nitric acid will do the most effectual work, to be followed by iodized phenol, tincture of iodine, solution of the nitrate of silver, or a similar agent.

3. The cystic hyperplasia is easily controlled by puncturing each Nabothian follicle with the scarificator, and immediately swabbing the cervix with tincture of iodine to produce obliteration of the follicles. The papillary hyperplasia is treated by scraping off the enlarged papillæ (granulations) with the sharp curette, or trimming them off with fine curved scissors, until the raw surface is perfectly smooth. The treatment directed to the cervical catarrh and the erosion will prevent their re-formation.

4. The erosion can be healed by painting it with the solution of the nitrate of silver (ʒ j., or less, to ℥ j.), or touching it with nitric acid, chromic acid, etc., and when the slough has separated, blowing finely powdered iodoform, or iodoform and tannin, equal parts, on it, and placing a tannin or vaseline tampon against it.

5. The cicatrix may be reduced in density and firmness by the same treatment as that described in Section 1, minus the scarification, and the congested ovary will yield to similar measures.

6. The chronic pelvic cellulitis and lymphangitis is benefited by painting the whole vaginal vault, as well as the cervix, with tincture of iodine, also by the hot douches and glycerine tampons, and, further, by a systematic course of tamponade of the vagina, which will also be found very useful to relieve congestion and displacement of the uterus.

7. The constant astringent tamponade of the vagina contracts and strengthens that canal and checks the leucorrhea ; and

8. The uterus may be prevented from resuming its displaced position by a proper pessary, as soon as the improvement of the cervix allows the cessation of the local applications.

As will have been noticed, several effects are produced by one or the other of these remedies, which enables us, for instance with iodine and hot water, to simultaneously reduce congestion, promote absorption of hyperplastic or cicatricial tissue, and exert a healing influence on an erosion, and thus save time and treatment.

As a rule, the stronger applications should not be made oftener than twice a week ; the glycerine and astringent tampons may be used every day, if convenient to the patient.

For the details of these applications, and other agents, I refer the student to the chapters on Applications to the Cervix and Vagina.

The length of time required to achieve a satisfactory result by the above-mentioned treatment varies very much in proportion to the intensity of the complications. If there is merely a laceration with eversion and superficial erosion, and no complications exist, no preparatory treatment whatever is required, and the rent may be sewed at once. Or, if the case is an old-standing one, and the complications are numerous and severe, several months may be required to put the cervix and its adnexa in a suitable condition to offer a good prospect for a successful operation.

As a rule, ordinary lacerations can be prepared for operation during one intermenstrual period, so that trachelorrhaphy can be safely performed a few days after the next menstrual period.

In some (exceptional) cases the operation may be indicated before *all* complications have been entirely removed. Thus, the follicles and granulations may be so numerous, or may return so rapidly, that only their complete removal by a cutting operation will prevent their reappearance; the proper plan is then to excise them thoroughly during the plastic operation. Or, the cervix itself is in good condition for operation, but there are still remains of chronic plastic exudation in the parametran cellular tissue, or the ovaries are still engorged and tender; here it is futile to defer closing the laceration, the very persistence of which perpetuates the adjacent disturbance, if the operation can be done with a fair degree of safety. In deciding upon the operation, under these particular circumstances, which are usually, and properly, looked upon as counter-indications, the utmost care should be observed to eliminate the possibility of re-exciting the inflammation, which has now happily become "chronic," by testing the susceptibility of the pelvic cellular tissue and the ovaries with measures likely to irritate them, such as gentle traction on the cervix, approximating the torn lips by tenacula or wire sutures, etc. Only when such mild manipulations, practised for a week or two, fail to produce reaction, can the operation be considered safe. And, during the operation, extraordinary care should be exercised to avoid forcible traction on the uterus.

An excellent preparatory measure, which has done me good service in several cases, is the approximation of the strongly everted lips of a hyperplastic cervix by a couple of silver wire sutures which are twisted more or less tightly, cut short, and allowed to remain while the patient goes about for one or two weeks before the operation. The sutures may be introduced in the operator's office, if the patient is willing to stand the moderate pain, one being passed on each side of the prospective external os. Their effect is not only to approximate the lips of the cervix and lessen tension on the stitches after the actual operation, but to produce a decrease in size of the lips by absorption of hyperplastic tissue. These preparatory, tentative sutures were of great service to me in a case of extensive laceration and excessive eversion, where an old chronic peritonitis not only complicated trachelorrhaphy but also rendered the approximation of the lips difficult. After the patient had worn the temporary sutures without inconvenience for two weeks, it was a matter of but little risk and difficulty to pare the edges and insert the permanent stitches, the result being a complete success.

In advocating active operative interference in certain cases of complication with old, inactive pelvic exudations, I am well aware that I am treading upon dangerous ground and opening the door to improper and meddlesome surgery. I must therefore repeat the caution, to choose such cases with the utmost care, and to avoid all traction on the cervix during the operation.

If the rent be a small one, the eversion and erosion slight, the cervical

catarrh trifling, and the "cicatricial plug" superficial, such palliative treatment as I have described may in the course of a month or two produce so much local improvement that no further treatment is required. I have thus seen an angry-looking rent, which appeared quite large enough to call for a plastic operation, gradually assume a pale color, the raw surface diminish in extent, the lurid tint of the mucous membrane change to a healthy pink, and the originally formidable tear dwindle to an insignificant nick, which it would be absurd to deem worthy of an "operation." In nervous, timorous patients it is well to remember this not improbable termination, and to give them the chance of escaping the much-dreaded operation. But they should be informed of the temporary nature of such relief, in order that no blame may be eventually cast on the physician for his failure to insist on a radical cure.

The *radical treatment* of a lacerated cervix, with or without complications, consists solely in paring the edges of the rent and approximating them by sutures until nature has united the raw surfaces permanently. Only in this manner can a rent be *cured*, or the everted and eroded surfaces of the torn lips be restored to health; not by the hot iron, the stick of nitrate of silver, or any other caustic or remedy. To glaze over a raw wound with a cicatricial film is merely to hide the injury, not to *cure* it.

It is this operation, which owes its origin to the genius of Emmet, and which is known as "Emmet's operation," or by the somewhat ponderous name of "hystero-trachelorrhaphy."

Indications for Trachelorrhaphy.

It is a difficult matter to lay down a strict indication for the radical operation of a lacerated cervix. Each case brings with it its own indication for or against the operation, and the special predilection of the gynecologist will go far toward deciding him to see in a certain case the necessity for a radical measure, or the possibility of relieving the symptoms by palliative treatment. Thus some gynecologists have seen cases by the hundred, which, in their opinion, demanded trachelorrhaphy (at least the number of operations reported by them reach that figure); and others of equal intelligence, prominence, and practical opportunities have scarcely ever performed the operation. I know of two specialists, both older men and bold operators, who have never done trachelorrhaphy, because they have never seen a case which could not be cured by other treatment (*sic!*); it is true, one of these gentlemen thinks he cures such cases by amputating the torn cervix, and the other claims to secure equally good results by the systematic tamponade of the vagina. Of course, neither of them *cures* the laceration; the first merely substitutes a flat raw surface, which he cannot well cover, for two eroded lips, evidently a very illogical proceeding; while the other, with more reason, temporarily relieves the symptoms by diminishing pelvic hyperemia.

Obviously, to these gentlemen, and others of like views, an indication for trachelorrhaphy does not exist. As usual, the proper course lies in the

middle, and the best *general indication* which I can formulate for this operation is similar to the conclusion given when speaking of the significance of the lesion, viz. : *The mere existence of a laceration of the cervix does not call for the radical operation ; the indication for that measure depends entirely on the depth of the rent, on the degree of eversion and the amount of erosion and hyperplasia of the torn lips, on the intensity of the symptoms unquestionably or probably depending on it, and on the improbability of these symptoms being permanently cured by other than radical treatment.*

Thus, as a rule, every laceration of the third degree ; every laceration with largely everted and eroded lips, with hyperplastic papillæ and follicles, with gaping and freely discharging cervical canal ; every laceration of a large subinvoluted or hyperplastic uterus ; every laceration with consequent hyperplastic hemorrhagic endometritis; every laceration with corresponding congested ovary or ovaries—should be operated on, and permanently cured, in order that not only the lesion itself, but its resultant pathological conditions, may be removed. Further, every laceration, whether completely cicatrized over or not, in which the cicatricial tissue in the rent seems, on careful observation, to be the cause of certain reflex neuroses in the pelvis or remote parts of the body ; every laceration in which the glazed-over surface breaks open at irregular intervals and annoys the patient by a bloody discharge (see Fig. 244) ; every laceration in a woman whose mother or near blood-relation died of malignant disease—should be subjected to the radical operation. The last-named indication, of course, is but a precautionary one.

Fig. 244.—Bilateral Laceration with Eversion, Third Degree, nearly Cicatrized. The two upper corners show fresh breaking down of cicatrix (P. F. M.).

Finally, if the operation of perineorrhaphy is to be performed, and a slight laceration of the cervix with moderate ectropium is also present, the question arises whether it is not best to close the cervical rent first, before placing it more or less out of easy reach. I have several times done the cervix operation first, and then the perineum at the same sitting, chiefly because I did not feel easy in leaving even a slight rent unhealed with a restored perineum. Should the cervical tear afterward give her trouble, she would naturally feel that it ought to have been repaired at the time the one operation was done.

In my article in the January, 1879, number of the *Journal of Obstetrics*, on the "Indications for Hystero-trachelorrhaphy," I specified a few indications for the operation which I will briefly enumerate here as additions to or modifications of those already mentioned : 1. Slight lacerations with persistent profuse cervical leucorrhea. 2. Slight lacerations in subinvoluted or hyperplastic uteri, where trachelorrhaphy is expected rather to reduce the size of the uterus than merely to cure the rent. 3. Hyperplastic

or cystic ectropium of one lip; here the enlarged lip is simply excised, and the raw edges are brought together by sutures. 4. Laceration of the cervical wall, of greater or lesser depth, not extending to or through the lips of the os; the result is a gaping os and a dilated, paralyzed cervix; by slitting the lips bilaterally up to the vaginal vault, trimming off diseased mucous membrane, and sewing together the raw surfaces, a speedy cure can be achieved. 5. Erosions, catarrhal, granular, and follicular, of the cervix, even in nulliparæ, which are well known to be exceedingly obstinate to the usual caustic and astringent treatment. By trimming off the eroded surface and uniting its edges with sutures, a much more rapid and certain cure can be attained than by the old methods (see Figs. 100, 101, 102, and 234 to 240).

I consider the operation *not indicated* (not *counter*-indicated, merely not called for) when the lesion is slight, when there is no erosion or but little eversion, no hyperplasia or other of the symptoms mentioned; where experience has shown palliative treatment to be sufficient to relieve the slight discomfort; and where there is absolutely no symptom present referable to the tear. Thus I have repeatedly declined to operate on lacerations even of the third degree, when there was neither eversion, erosion, cervical catarrh, nor other symptoms present. On the other hand, I have operated on slight lacerations when the symptoms seemed to warrant it, and have never had occasion to repent my action.

In considering the advisability of performing trachelorrhaphy in a doubtful case, such as a slight laceration with moderate eversion and erosion, the gynecologist should remember that by a trifling operation he can in a couple of weeks permanently cure his patient, while the tedious and uncertain palliative treatment will probably occupy several months; and he should place the facts and the alternative squarely before the patient and let *her* decide. Many patients recoil from the mere word "operation," and would rather undergo *any* local treatment than be "cut." Such timid people should be spared that word, and merely be told that the "tear will have to be sewed," when their consent is usually obtained.

A rather remote indication, and one which the physician should not take undue advantage of, is the moral effect which the knowledge of having a "torn womb" has on a patient's mind, and her desire to be restored to as nearly perfect a condition as possible. Unquestionably, in pronounced cases, this indication for trachelorrhaphy is perfectly allowable.

Operation.

In no operation in gynecology is it more essential to be provided with the proper instruments than in that of hystero-trachelorrhaphy. The necessity of operating through a speculum, the usual tough character of the tissue of the cervix, the mobility of the uterus, and the confined and limited field of operation, render this otherwise comparatively trifling operation one of the more difficult procedures of operative gynecology, dexterity in which can only be acquired by practice. Hence it is particularly important that the part to be operated on should be freely ex-

posed, that the scissors with which the paring is done should have the proper curves and the requisite sharpness ; that the tenacula with which the cervix is drawn down and steadied, should be correctly bent and of stout, inflexible steel, with hooks of the right length ; that the needles should be sharp, of proper length, curve, and temper ; the silk which carries the wire sufficiently strong not to break at the critical moment when the wire is being drawn through ; and finally, the wire of pure silver, and the correct size, so as not to crack or twist off when the edges are approximated. While all these points are of importance in every operation, they are of especial interest in trachelorrhaphy, where the field of operation lies in a cavity, and where everything has to be done through the mediation of long-handled instruments, every one of which needs to

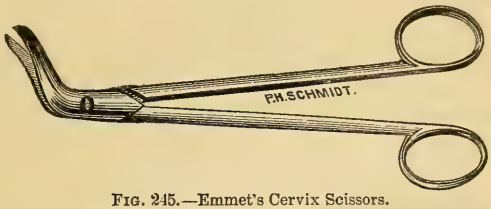


Fig. 245.—Emmet's Cervix Scissors.

be picked up and laid down again so many times in the regular course of a successful operation, that any interruption or accident, such as the bending or breaking of a needle, the tearing of the silk loop in a needle, or the cracking of the wire while being twisted, or even the repeated tearing out of the tenaculum from the naturally brittle tissue of the torn surface while paring, greatly prolongs the operation and renders it unsatisfactory to the operator. It is therefore particularly advisable, before beginning, to inspect the instruments and to note whether everything is as it should be.

The following instruments are necessary for trachelorrhaphy :

A broad, short, flat, Sims operating speculum.

A depressor with wooden handle.

2 solid steel tenacula, made for trachelorrhaphy.

1 small hook, slender tenaculum.

2 Emmet's small curved cervix scissors, right and left.

1 Emmet's stout needle-holder.

1 Mundé's counter-pressure hook.

1 Emmet's twisting forceps.

1 Sims' shield.

1 stout wire scissors.

6 Schnetter's cervix needles, long and medium.

6 Sims' or Hanks' cervix needles, long and medium.

Braided silk, medium size.

Pure silver wire, No. 27, several coils, and one coil No. 33 (fine, for superficial sutures).

6 metal sponge-holders. Fine grained, cheap sponges, to be cut into suitable pieces.

1 Simpson's sound.

If no broad operating speculum is at hand, the ordinary Sims will do very well, and I have frequently operated through my flange speculum. If the vagina is very capacious, with flabby walls, the flat speculum is decidedly preferable. The solid steel tenacula have handles with wooden coating, and are highly tempered, so as not to bend when the cervix is steadied by them during the passage of the needles ; the ordinary tenacula are liable to bend so much as to be useless. The small-hooked tenaculum is intended to hook up the flap to be removed ; a long-hooked tenaculum would enter so deeply as to be in the way of the blade of the scissors.

The slender sharply curved cervix scissors are liable after several operations to become loose in the joint and to feather while cutting ; it is well, therefore, to inspect them when preparing for an operation, and to have the screw tightened if it is found loose.

The counter-pressure hook is used to steady the posterior lip of the cervix while the needle is being forced through, its point passing between the two prongs of the hook.

The wire scissors are merely long-handled, stout scissors which cut well down to the point.

FIG. 246.—Mundé's Counter-pressure Hook for Trachelorrhaphy.

Schnetter's needles were not originally intended for trachelorrhaphy, but I chanced to see them, and found them so useful that I now employ them almost exclusively. There are three sizes, one and one-half inch, one inch, and three-quarters of an inch ; the latter are too short for this operation. The peculiarity of this needle is that it pierces the tough tissue of the cervix more easily than any other needle, except a spear or lance-point, which makes a larger hole, and is liable to cause more oozing. Schnetter's needle has an anterior and posterior cutting edge, and is convex on either side. The majority of operators, I believe, still use the old Sims-Emmet cervix needle, as I did until a year ago. It is a stout round needle, of two lengths, with slight curve, and whittled-off point on the concave surface. It is well to have both kinds, and to be plentifully supplied, as one may break or bend several needles at any operation.

Of course, other needles will answer for this operation, if they are only stout and have a cutting point, but the two kinds mentioned are, so far as I know, the best. Recently Dr. H. T. Hanks, of New York, has introduced a very good needle, which is round with a posterior cutting surface at the point. A round needle with a simple point, like a darning-needle, is the very worst possible one to thrust through a dense cervix ; and a flat, sharp, surgical needle is almost certain to break or bend.

At least three needles should be threaded for a cervix operation, two long and one short ; but I usually have six or more ready, to avoid possible delay in case of accident. How to thread them has already been described in the introductory section.

Assistants.—Four assistants are needed, two of whom—the one in charge of the ether, and the one to hand the instruments, thread needles, etc.—must be physicians ; of the other two, one can be, and usually is, a nurse, who holds the speculum, and the other also a nurse, or some person who does not faint at the sight of blood, to wash and hand the sponges on their holders. Of these assistants, the etherizer must necessarily be a thoroughly reliable man ; the others can be beginners, although a trained nurse and an assistant thoroughly conversant with the instruments used in this operation are (as in every operation where assistants are required) sources of great comfort to the operator. I should always advise the operator to be provided with good assistance, and plenty of it; it is in the interest of the patient not to have delays and accidents through insufficient or incompetent assistance. In addition to the four named, it is always well to have some woman at hand to bring fresh water, empty the soiled water, hold the basin if the patient vomits, etc.

Preparation of the Patient.—The general preparatory measures, such as tonics, regulation of functions of skin, kidneys, bowels, etc., have already been referred to in the General Chapter.

The local preparatory treatment immediately preceding the operation consists in securing a thorough evacuation of the bowels by a laxative on the day before the operation (generally taken on the evening of the last but one before), followed by one or more enemata on the morning of the operation, in order to clear out the rectum and prevent the unpleasant occurrence of the oozing or squirting of fluid feces from the anus during the frequent retching and vomiting while under ether, an accident very liable to happen if the laxative was not given until the night before and had not finished acting when the operation was begun. Further, immediately before the anesthetic is administered, a copious vaginal douche of hot (110° F., or more) carbolized (two per cent.) water should be given, to contract the utero-vaginal capillaries ; if preferred, this douche may be given when the patient is anesthetized and on the table, which is perhaps the better plan. The oozing during the operation is greatly diminished by this practice. An astringent should not be added to the injection, however, as it would contract the vagina too much.

The manner of giving the anesthetic differs in no way from that for other operations, and has already been described in the Introductory Chapter. In one respect, however, trachelorrhaphy differs from all longer operations on the female genitals or elsewhere, in that it is possible, even in our day of invariable anesthetic operations, to perform it without an anesthetic and without the patient experiencing very severe pain. The cervix is not, as a rule, a very sensitive organ, and the pain inflicted during trachelorrhaphy is chiefly that produced by the dragging and jarring of the uterus during the forcing through of the needles ; the paring is seldom complained of. I have thus performed the operation some eight or ten times without an anesthetic, usually because it promised to be a rapid and easy case and the patient preferred a small amount of pain to the discomfort of the anesthesia and the nausea following it, and once because a mitral ste-

nosis prohibited the administration of an anesthetic. But I have decided that, with this one exception of organic cardiac or pulmonary disease, or of an unusually irritable stomach, I shall not again omit the anesthetic, because the nervous shock of being conscious of every step of the operation and the cramped position on the table for half an hour or longer, seem to leave an effect on the patient scarcely less unpleasant than the temporary consequences of the anesthetic. Besides, the expressions of pain which more or less involuntarily escape even the most courageous woman, at times, during trachelorrhaphy are liable to induce the operator to hasten the operation and thus do his work less thoroughly than if he were entirely untrammelled as to time and the patient's sensations.

In cases where an anesthetic is inadmissible, the patient's sensibility may be blunted by giving her a drachm of one of the bromides in divided doses some hours before the operation, or a morphine suppository and a couple of ounces of whiskey half an hour before, or all of these together, if she is exceptionally nervous.

Details of Operation.—The operating table is placed in front of a window so as to have the light fall on its lower end over the right shoulder of the operator, who sits slightly to the left of the centre of the lower end of the table. The instruments are spread on a smaller table, covered with a clean white cloth, to the right of the operator, or they may be bathed in a weak disinfectant fluid contained in flat pans; but, if they have been properly cleansed and disinfected immediately before the operation, this usually suffices; the basin with ice-water, containing the sponges attached to the holders, stands on a table or chair to the right of the first assistant, who takes the cleaned and dry squeezed sponges from the nurse and does the sponging as occasion requires, and hands the soiled sponges back to the nurse. A bucket for slops stands by the nurse. The speculum and depressor are in a basin of warm water on a chair immediately to the right of the operator, who dips the instruments in it at will during the operation as they become clogged or clotted with blood.

The patient is placed on the table in Sims' position (the anesthetic having usually been given in her bed or in an adjoining room while the instruments are being prepared), the operator introduces the operating speculum, exposes the cervix and cleanses it carefully of mucus with a sponge on its holder, and then grasps the cervix firmly with the stout, right-angle hook tenaculum at the spot where he intends to make the first incision, seizes the scissors curved to the left, and begins with a quick clip. If the laceration is a bilateral one, whether of equal depth or not, or if it be on the left side only, the incision begins at *a*, the flap held by the tenaculum on the anterior lip is rapidly trimmed off down to *e*, and then, care being taken to excise all the cicatricial tissue down to the very bottom of the angle at *e*, is carried on the posterior lip to a corresponding point *b* with the point of commencement *a*, on the anterior lip. To make sure that the flap on the posterior lip is not larger than the anterior, it is well to mark its limit at *b*, with the other scissors (right curve), before cutting out with the first pair. If this flap from *a* to *e* to *b*, can be removed in

one piece, time will be saved. If the right-angle tenaculum tears out, the small-hooked slender tenaculum may be substituted, and with it the angle *e* well lifted up to make sure of its being thoroughly cut out. The tearing out of the tenacula is a source of great annoyance in this operation, and if the tissues are grasped too deeply, the scissors will cut on the tenaculum. Merely the mucous membrane or cicatricial tissue is trimmed off; the muscular tissue need not be removed unless it is hyperplastic and the lips resist coaptation. It will be noticed by looking at the diagram that the internal border of the pared surface is so placed as to be on a line with the edge of the prospective cervical canal and external os, which should be about one-fourth of an inch in diameter. The same relation is to be observed on the other side of the cervix, if the rent is bilateral. After the flap has been removed, and the borders of the wound have been trimmed smoothly, they should be brought together with tenacula to see whether they fit and are likely to make a clean cicatrix. The operator now proceeds to denude the other, or right side of the rent, beginning at *c* and trimming off a flap (*c e d*) corresponding to the left side in the same manner. If the rent on one side should be smaller than on the other, of course the denuded surface will also be smaller. If necessary, the denudation may extend slightly on the vaginal mucous membrane proper, but care should be taken not to go too far, as then a larger number of sutures are required, and puckering is likely to take place.

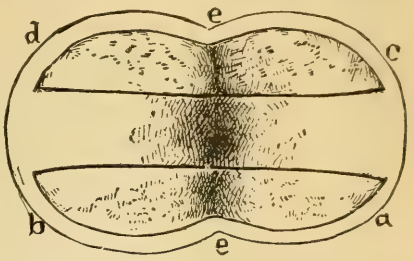


FIG. 247.—Surfaces Denuded in Bilateral Trachelorrhaphy. Undenuded strip for cervical canal in centre (P. F. M.).

While it is important to excise all the cicatricial tissue in the angles of the rent, it is well to remember that too deep or extensive an incision brings the risk of cutting the circular artery or one of its branches. Should this occur, or if the parenchymatous oozing is at all profuse, it can generally be arrested without difficulty by passing a deep wire suture through the vaginal roof at the very bottom of the angle and twisting it at once.

The cervical tourniquet recommended by Emmet has never been required in my practice, nor have I ever seen him use it. In marking out the limits of the external os, care should be taken to leave that orifice somewhat larger than the canal above, so as to make the cervical canal slightly funnel-shaped. The contraction naturally occurring at the external os during cicatrization renders this precaution necessary to avoid having subsequently a too narrow orifice. I shall mention further on how this contraction may be prevented. The utmost care should be observed to *cut out* all retention-cysts ("ovula Nabothi") which are situated in the line of denudation; merely opening them is not sufficient, as they will fill again, and either interfere with primary union or later cause nodular irregularities on the cervix. Each follicle should be lifted with a tenaculum and cut out with scissors. The raw surfaces and their edges having been

trimmed smooth, and on coaptation with tenacula appearing symmetrical, the sutures are introduced, the first being passed through the vaginal mucous membrane and cervical tissue at the angle of the upper or right tear, if there is much oozing, in order to stop the blood from flowing over the field of operation below. This first suture is introduced through the anterior lip, at a right angle to the cervical canal, and then passed through the posterior lip from within outward in the same manner, entering and escaping about one-quarter inch from the edge of the wound. It is well to hook and fasten the wire in the silk loop before beginning the suture, as by a rapid jerk in pulling out the needle the short silk loop might also be pulled entirely through and out. Counter-pressure is made by a solid tenaculum on either lip, or by the counter-pressure hook on the posterior lip, if the tenaculum tears out and produces much gashing. The object of passing this and all the subsequent sutures (except the innermost one

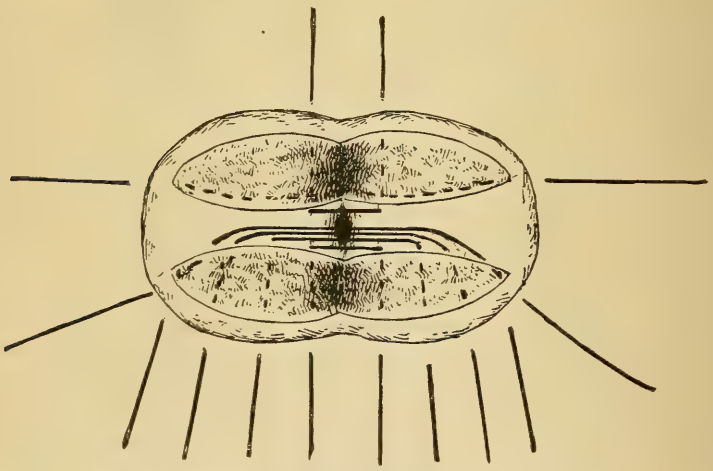


FIG. 248.—Introduction of Sutures in Trachelorrhaphy (P. F. M.).

on each side) at a right angle to the cervical canal, bringing each out in the undenuded tissue of the canal on the anterior lip and reinserting it in the same manner in the posterior lip, is to secure perfect adaptation of the flaps and prevent imperfect union in the canal.

The first suture having been passed, the ends of wire are twisted loosely and handed to the nurse, who holds the speculum, to guard with her left hand, if it be the upper angle which is first sewed, or they are turned down under the angle of the speculum and kept there if the left tear is the one being sutured. The next sutures are introduced in the same manner until the last one is reached, which is passed straight across close to the edge of the proposed external os. This is done in order to make the lips of the os come smoothly together without everting when the sutures are twisted.

Four deep sutures on either side will usually suffice, although occasionally, in deep unilateral tears, five or six are required, and once, in a

large irregular tear of a prolapsed uterus, I used ten sutures on one side. One or more superficial sutures may be required if there is any gaping or puckering after the sutures are twisted.

It is important, of course, to see that the points of entrance and of exit on either lip correspond as nearly as possible in location, and that sutures do not cross each other in the tissue, which would produce strangulation of that part and consequent sloughing. To be sure that the sutures answer the purpose of neatly coaptating the lips, it is well to draw the lips together for a moment immediately after each suture is passed by crossing the ends of the wire.

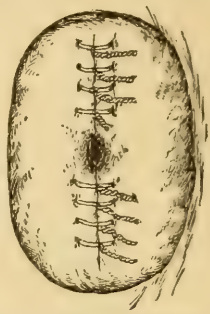


FIG. 249.—Sutures Twisted and Turned Down in Bilateral Trachelorrhaphy (P. F. M.).

The sutures having all been introduced on both sides, they are twisted (as described in the Introductory Section), care being taken to coaptate the lips of the wound with tenacula as nearly as possible. As each suture, beginning with the one nearest the angle, is twisted down to the surface, it is bent short over a tenaculum and laid flat against the anterior lip of the cervix, and there cut off by a quick clip of the wire-scissors, not more than one-quarter inch from the junction, so as not to leave the end projecting. This is a point of considerable importance. Usually I turn the sutures down in front, as they are more easy to find there when the time comes to remove them. But at times I have laid them down alternately in front and behind, so as to act as splints to the lips. But I do not think

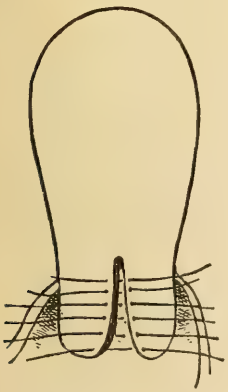


FIG. 250.—Section View of Introduction of Sutures in Trachelorrhaphy (P. F. M.).

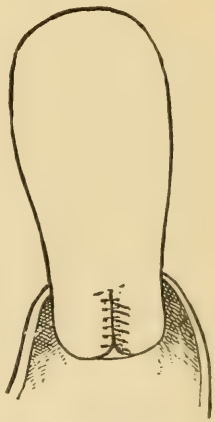


FIG. 251.—Section of Sutures Twisted in Trachelorrhaphy (P. F. M.).

this plan much of an improvement. If there is any gaping or puckering along the line of union, it can now be remedied by as many superficial, No. 33 wire, sutures as necessary. The sutures should always be counted and their number noted down by the operator, assistant, or nurse, so that

none which may have buried themselves in the tissues will be forgotten when they are removed a week or more later.

Particular attention should be paid not to twist the sutures too tight; the line of union should be as smooth and free from puckering between the stitches as possible. And if any spot, usually the lips of the prospective external os, appear blanched, one or both of the nearest sutures had better be loosened a little by passing two tenacula under the stitch and separating them, or else sloughing of this part is very liable to occur.

All the sutures having been twisted and cut short, the sound is passed through the newly made external os to the fundus, to make sure that the canal is thoroughly pervious, the blood is sponged or washed away, and the speculum is removed. The operation is finished.

If an easy case, or if unilateral, it may have occupied but twenty or thirty minutes; if very extensive, or, if mishaps have occurred, in the shape of hemorrhage, breaking of needles or wire, etc., it may have lasted longer than thirty, and even forty-five minutes. The more dexterous the operator, the more rapid, as a rule, the operation. But it is essentially true of this particular operation, that the more hurry the less advance, and that, to be well done, it must not be hurried.

The patient is now removed to her bed, and, when conscious, is given a hot vaginal douche of a one to two thousand corrosive sublimate or two per cent. carbolic acid solution, with or without alum, as the preference of the operator may decide. This is done partly as an antiseptic and partly as a styptic against possible parenchymatous oozing.

Possible Modifications in the Operative Details.—Following the lead of Emmet, I greatly prefer the scissors for this operation; but in former years I have repeatedly performed it with the knife, using slender blades attached at right angles to a long handle, which I brought with me from Heidelberg, where Simon had introduced them for vesico-vaginal fistula operations. They were quite useful in picking out the "cicatricial plug." But when the fine curved scissors now in use were made I no longer had any difficulty in thoroughly cutting out the angles, and since then have not used the knife.

Special instruments have been contrived by Skene and others to punch out the "cicatricial plug," but I do not think they are generally employed.

If the cervical tissue is very friable, and the tenaculum is constantly tearing out, a very good way of securing a firm hold and guiding the part during the operation is to pass a silver suture through both lips, close to the prospective external os, and twist the ends lightly; the cervix can then be drawn down and from side to side by this suture, as the operator may desire. Or it may be passed only through the anterior lip, if it appears that the lips are too much approximated for careful paring or suturing when the wire goes through both. This suture, if properly placed, may then be left and utilized when the wound is to be closed.

If at any time during the operation the oozing becomes too profuse or annoying, the upper suture next to the angle, or all the sutures on one side may be inserted and twisted at once before paring or suturing the

other side. This usually arrests profuse oozing at once, or they may be twisted loosely, and undone later on to be twisted permanently.

I have never known an alarming hemorrhage, or one that was not immediately arrested by twisting one or all of the sutures, occur in this operation. Should there be any doubt as to whether the deepest uppermost suture has effectually compressed the spurting artery in the angle, another still deeper suture can be passed through the vaginal vault, above the first, and twisted in the usual manner.

Fig. 252.—Line of Denudation in Bifid Posterior Fissure. The dots show flaps to be excised (P. F. M.).

Anterior and posterior lacerations are operated on after the same principle. There is less danger of hemorrhage, but care must be taken in the anterior variety not to pass the first suture too far out for fear of by an unlucky chance including one or the other ureter near its termination in the base of the bladder. Irregular lacerations, like bifid or stellate, are best treated by excising redundant tissue and flaps, and making either a unilateral or bilateral, or an anterior or posterior fissure out of them. To endeavor to pare and sew together the lips of the various fissures separately would surely result in failure as to union, or in a cicatricially contracted, misshaped cervix.

It is, of course, important to always place the external os at the very apex of the cone represented by the newly formed cervix; a lateral os would probably be a cause of sterility. In certain cases of cervical hyperplasia it is necessary to cut away so much tissue from one or both lips to enable smooth coaptation, that the cervical canal and external os have to be encroached upon. When this is necessary, or when by carelessness or accident the external os has been left too small, a glass stem, such as is used in flexions, may be inserted when the sutures have all been twisted, and left *in situ* (if well borne) until the sutures are removed. If then thought advisable, it may again be introduced and retained so long as the patient is in bed. It does not seem to interfere with union, and certainly secures a patulous cervical canal.

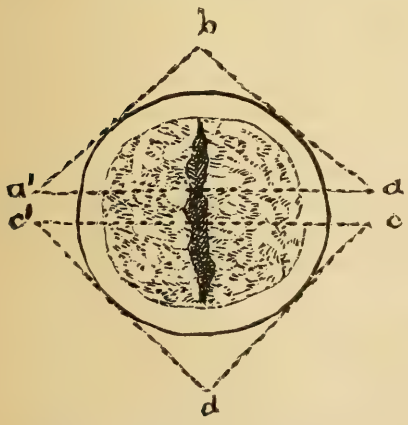


Fig. 253.—Wedge-shaped Excision in Hyperplasia of Lacerated Cervix, Showing Outline of Incisions (P. F. M.).

When the lips of the cervix have become so hyperplastic and dense as to prevent their approximation by tenacula, it is necessary to excise more tissue than is usually done. Instead, therefore, of merely paring off the cicatricial or mucous tissue from either lip, a distinct wedge of uterine

substance should be excised as shown in Fig. 253. One blade of the stout perineum scissors (see Fig. 261) is passed into the cervical canal and a cut is made through the anterior lip to *a ;* this incision is then carried to *b*, in the upper, or right angle of the rent. A similar incision is then made in the posterior lip to *a'*, and the wedge finally excised by a cut *a'* to *b*. The same procedure is repeated in the lower, or left angle, of the rent. The cervix then presents the appearance shown in Fig. 254, a thick, triangular wedge having been excised from each lateral angle of the tear. The sutures are introduced in the usual way. A branch of the circular artery is very liable to be cut in this operation, but the deep vaginal suture will at once arrest hemorrhage.

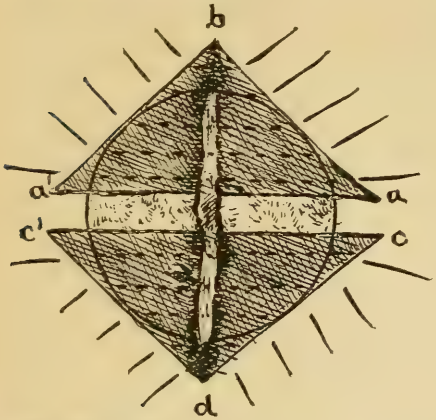


FIG. 254.—Appearance of Raw Surfaces and Introduction of Sutures in Wedge shaped Excision of Lacerated Cervix (P. F. M.).

Some operators habitually use silk sutures only, and Dr. Skene, of Brooklyn, reports excellent success with this material. I doubt not that it is quite as good as wire, but having once become used to and being satisfied with the latter, I have had no desire to change. Besides, it must at times be difficult to knot the silk high up in the vagina.

In Germany, the dorsal position is generally used for trachelorrhaphy, the cervix being exposed through Simon's or Fritsch's specula. We here are too well satisfied with the Sims to care to change.

Precautions during the Operation.—While a moderate amount of traction on the cervix is necessary, unavoidable, and justifiable, care should be taken not to use too forcible or too rapid traction, especially if there be the least suspicion of adhesions. One cervix may be drawn to the vulva with the greatest ease and without the slightest danger of inflammatory reaction, while another, apparently equally mobile, scarcely descends half an inch without force. The more children a woman has had, *ceteris paribus*, the more movable is her uterus.

Further, in cutting out the angle, remember not to cut *too* deeply or *too* far into the vaginal tissue ; and, above all, *leave the external os sufficiently large, so that no subsequent contraction can possibly produce sterility.*

After-treatment.—This is exceedingly simple. For the first few days the diet is fluid, until the bowels are moved, which is done by a mild laxative, with or without enema, on the third day ; after that, ordinary food may be permitted, the bowels being moved every day. One tepid, carbolized vaginal douche per day is given, if there is no, or but slight, oozing. If there is bloody discharge of any amount during the first few days, as may well be the case if the patient retched much after being put to bed, one or two teaspoonfuls of powdered alum should be added to the pint of

hot water; and if there is considerable discharge two douches per day are given.

As a rule, in cases which are doing well, where the sutures are not cutting too deeply and no sloughing is taking place, there is very little or no discharge of any kind, either bloody, serous, or mucous, and some operators dispense entirely with vaginal douches.

The patient remains in bed in a recumbent or slightly reclining position, but on no account must she sit or get up. If she can, she must urinate in the bed-pan, and her bowels must move into the same receptacle. A catheter is seldom needed; indeed, rather than employ it unnecessarily, I let the patient try to urinate in the knee-elbow position, before having the urine drawn. In this position there is absolutely no downward pressure on the vaginal vault.

Usually patients suffer no pain after trachelorrhaphy, with the exception of slight soreness in each groin and some sacralgia. The former is due to the traction on the uterus, the latter to the cramped position during the operation. The majority of patients complain of the irksome confinement in bed, and ask when they may rise; and such I generally allow to read, do light needlework, and see a few visitors.

Removal of Sutures.—Not sooner than the eighth, and usually not later than the tenth, day the sutures are removed. The bowels having been moved the day before, are left quiescent for forty-eight hours. The vagina is cleansed by a douche, and the patient placed in Sims' position, and the speculum introduced. It is exceedingly important to get a good view of the cervix for this maneuvre, as a sunken or imperfectly visible suture may detain one for half-an-hour or longer, and ill-directed traction may burst open the freshly united wound.

Having carefully cleansed the cervix with a sponge, a tenaculum is hooked into the posterior surface of the cervix, and the latter is drawn gently down and toward the anterior vaginal wall, so as to bring the blackened sutures well into view. Beginning with the upper side (as I usually prefer to do, because it is the most difficult), the twisted part of the farthest suture is caught in a long-catch dressing-forceps, and gently lifted from its bed of indentation and drawn upon, until the glistening white of its point of junction at the base of the twist is seen, when it is clipped with the wire-scissors, and drawn out over the line of union, so as not to separate the lips. This maneuvre is repeated until every suture is removed. Occasionally the tenaculum is found useful to seek and pick up the hidden twist of a suture, for the forceps to catch it. The utmost caution must be observed not to cut off the suture at the point where the twist begins, as it is almost impossible to find the suture later. I have several times done this when the suture was deeply buried; or I have, for the same reason, overlooked a suture, and have found it accidentally, or have been informed by the husband of its presence, and have removed it long afterward.

When all the sutures have been removed, it is best not to be inquisitive, but to wait a few days longer before ascertaining with absolute cer-

tainty whether the result is a perfect one or not. My experience has been that if the cervix looks smooth and has its normal pale rose-color, if the sutures lie flat as they were originally placed, if the tissue between the sutures is not puffy and inflamed-looking, and if there has been no appreciable discharge, particularly no offensive secretion after the first three days, that union is perfect.

I usually place a couple of flat tampons soaked in an alum or tannin and glycerine solution against the cervix, and have the patient returned to her bed, where she stays for three or four days longer until union has become more firm and the suture canals have closed. After the tampons are removed, the usual douche is given every day. On the eleventh to fourteenth day the patient is allowed to sit up; about the thirteenth or sixteenth day she may walk about, and gradually go down stairs; and about the twenty-first day, or a little later, she is directed to call at the office for a final examination.

If she was wearing a pessary, she may have to stay in bed a few days longer, and the supporter should be inserted before she rises. If introduced too soon after the operation, and if the patient is up, the traction on the fresh cicatrix may stretch it and cause gaping of the os. Hence, if this is to be feared, astringent tampons may need to be applied every other day for several weeks until the cicatrix is sufficiently firm.

If menstruation should unexpectedly come on, as it is quite liable to do from the irritation, physical and mental, of the operation, the sutures should be allowed to remain until the flow has ceased, even if it lasts two weeks or longer. That is, unless expulsive efforts show that the uterus is trying to cast off coagula, when some or all of the stitches must be removed, and the operation is a failure. If the bloody flow is evidently menstrual, it is best not to disturb this natural function, and the usual vaginal douches had better be omitted. If there has been considerable discharge, I occasionally expose the cervix through the speculum on the eighth or tenth day, and if I find it looking well and the stitches not cutting or irritating, I may leave them in three or four days longer to make sure of union. But if the discharge is decidedly offensive, it may be a sign of partial sloughing of the cervix, and an early removal of the stitches may be called for. If the stitches are well placed and not too tight, they can be left in for weeks without injury, as is necessary when cervix and perineum are operated on at the same sitting.

Results Achieved by Trachelorrhaphy.—The beneficial consequences of this operation, in common with the pathological significance of these lacerations, have no doubt been exaggerated by the most ardent of its advocates. Unfortunately, not every disease that female flesh is heir to is due to a laceration of the cervix uteri or one of its complications, and is curable by repairing that lesion. Hence, in doubtful cases, where the operation was performed on a more or less presumptive indication, either because there happened to be a laceration and the prevailing fashion required that an "operation" of some kind should be done, or in cases where absolutely no other cause for certain local and general pains and neuroses could be

found than, as a last resort, a moderate cervical rent, in such cases a failure to achieve the beneficial results expected undoubtedly has often occurred, and still will occur. The same may be said of experimental measures, operative and otherwise, in other parts of the body. But such failures by no means invalidate the brilliant results which may confidently be expected and usually follow the operation where it is clearly indicated. Thus, the restoration of the cervix to its integrity, as well by the preparatory curetting, scarification, astringent and caustic treatment, as by the final plastic operation, may be relied upon to relieve and probably cure the following conditions: Subinvolution and hyperplasia of the cervix and the whole uterus (I have frequently seen this organ diminish from three and a half to two and a half inches within several months after the operation); cervical and corporeal endometritis; menorrhagia (nothing can be more sure than the cure of this symptom if it depends on vegetations of the endometrium induced by subinvolution following a lacerated cervix); chronic ovarian congestion (maintained by sympathetic, perhaps lymphatic, irritation from the eroded laceration). A simultaneous improvement in the management of uterine displacements, which occur so frequently together with laceration of the cervix, and the above-named conditions, is another beneficial result from the operation.

The benefit in the so-called neurotic affections is not so assured or complete. Still, Emmet's testimony decidedly favors this point, and the cases which I have related in this article prove that such a thing as a reflex connection between certain peculiar distant neuroses and a cervical laceration does exist, and that these neuroses are (at times, at least) curable by trachelorrhaphy. Exactly how much of this benefit is due to moral and how much to physical influences, and in precisely what cases a good result may be expected, and in which others failure will ensue, all this is subject to the uncertainty peculiar to nearly all nervous affections. Of this I am certain, that I have seen nervous, anemic women, who constantly complained of "backache," of bearing down, of pelvic and general neuralgia, of leucorrhea, loss of appetite, etc., gain flesh and color, lose not only their local but also their general "aches," and their nervousness, within several months after a successful trachelorrhaphy. And why, therefore, should I not agree with them in attributing all this improvement to the operation?

One thing should be remembered, and patients ought to be told of it, namely, that they must not expect an *immediate* cessation of all their aches and pains as soon as they have left their beds; that, indeed, for a few weeks they may still feel a little weak, perhaps even a little worse, as a direct result of the operative manipulations; but that the benefit is sure to manifest itself gradually in the course of the next three months.

Now a word about the *influence of trachelorrhaphy on sterility*. It is a question under dispute as yet, whether the operation *cures* acquired sterility. Some even go so far as to say that it produces sterility, but that point I will discuss hereafter. I am willing and able to answer this question as to whether it cures sterility, so far as to claim, without hesitation, that when the sterility is absolute, and depends on the presence of a cervical catarrh; further,

when the sterility is virtual, that is, when conception takes place but always ends in abortion, either from chronic endometritis or from exposure of the ovum to external irritating factors—in such cases trachelorrhaphy undoubtedly cures sterility. I am unfortunately not able to prove this assertion satisfactorily to others, I fear, since my practice as an exclusive specialist, to whom many operative cases are brought by general practitioners, into whose care they subsequently return, never again to be heard from by the operator, prevents my being informed as to whether pregnancy followed the operation or not. Therefore I am in possession of but 13 instances, out of 137 operations, in which conception ensued, nearly all of which occurred in patients of my own, whom I subsequently attended in labor. But I am sure, judging from the class of cases in which I know conception to have taken place, that the number must be much larger, quite as large, indeed, as the average of conceptions in married women. In a table compiled by my assistant, Dr. B. H. Wells, I find recorded 141 conceptions after 1,456 operations. When we consider the difficulty of obtaining such statistics, and the various other factors influencing conception, the number mentioned is quite sufficient to establish the fact that trachelorrhaphy, at all events, does not *prevent* conception.

Counter-indications to Trachelorrhaphy.—So much has already been said about the indications, that a very few words will suffice to state when the operation should not be performed, even though the laceration clearly calls for it. When the uterus is more or less fixed in the pelvis by adhesions or plastic exudation of so recent a date as to be painful to the touch, when, in fact, the touch of the examiner convinces him that the irritation accompanying trachelorrhaphy would be very likely to rekindle the pelvic inflammation, then the operation is positively counter-indicated. At the same time, there are instances of *old*, insensitive exudations, which have practically become utterly passive, where the operation, carefully performed, with the avoidance of all force or traction, is not only advisable and safe, but actually beneficial. I have thus felt justified in operating three times with the happiest results, the stimulus of the operation (the slight depletion, presence of the sutures) and the removal of the raw secreting surface, inciting absorption of the exudation. But such cases must be carefully selected.

The operation is further counter-indicated, for the time being, if the cervix has not been thoroughly prepared, as described in the section on Preparatory Treatment, and if there is not sufficient time for the wound to heal, and the stitches to be removed in due season before the next menstrual flow. The operation is absolutely counter-indicated during pregnancy.

Possible Dangers during and after the Operation.

While all writers on this subject have fully discussed and well-nigh exhausted the various aspects of this subject, no one seems to have thought it worth his while to consider whether the operation is entirely free from danger, and what the accidents are which may *possibly* happen during and after the operation. That such dangers do exist, and that accidents do

occasionally occur, I was fully aware, for I had had several unpleasant experiences myself, and knew of others in the hands of other operators, whose names are sufficient guarantee that neither carelessness nor inexperience were at fault. If, then, there were dangers and accidents in Emmet's operation which were more or less inherent to the nature of the parts involved and their proximity to large blood-vessels and cavities and to the peritoneal membrane, and which, therefore, were not always to be avoided, it was our duty to recognize them, guard against them as much as possible, and not look upon trachelorrhaphy as an always absolutely harmless operation. Of course, we all know that in the large majority of cases it is harmless, and no one would think of calling it a dangerous operation, or of advising a patient to make her will before submitting to it. But as *no* manipulation, however trivial, of the internal female genital organs can be considered *absolutely* and *always* without danger; for even sounding, intra-uterine applications, the curette, dilatation, while usually practised with impunity, have each had their victims—therefore why should not trachelorrhaphy have its occasional perils? To ascertain, then, whether a certain celebrated authority was right when he made the dogmatic assertion to a gentleman of my acquaintance that "in this operation *good* operators never meet with dangers, the bungler finds all the complications," I suggested to my pupil and assistant, Dr. B. Hughes Wells, to use this subject for his graduation thesis. This he did, and his article was published in the *American Journal of Obstetrics* for June, 1884. From it I draw the following facts and figures, which not only show that accidents do occur, but that operators like Emmet, Hunter, Goodell, Mann, Jackson, Lusk, and Reamy, certainly no "bunglers," have each one or more such to record. What these accidents are I shall now proceed to state.

Dangers during the Operation.

1. *Primary Hemorrhage.*—I have already spoken of this occurrence while describing the operation, and also of the means of checking it, either by *hot* sponges, if it is parenchymatous, or by deep sutures through the upper angle of the wound, and by early twisting of all the sutures on the bleeding side, if it is diffuse or an artery is wounded. I need therefore not enlarge upon this subject again.

2. *Too Thorough Denudation.*—This occurrence has also been referred to, and can scarcely be called either an accident or a danger, since it is solely the fault of the operator. It is easily avoided by carefully tracing out the limits of the flaps to be excised, and by remembering when beginning the operation that it is always easy to remove more tissue, but that, once removed, it cannot be replaced. The consequence of too thorough denudation is either the wounding of arterial twigs, or the extension of the wound on the vaginal mucous membrane proper, which results in puckering when the stitches are twisted. But a much more serious consequence ensues when the denudation is carried too far inward toward the cervical canal, leaving too small an external os, and too narrow a canal.

Here sterility and even dysmenorrhea may ultimately ensue, and require the dilatation or even incision of the constricted part. The employment of a glass plug to prevent such excessive contraction or adhesion in certain cases has been already referred to.

Dangers after the Operation.

1. *Sloughing of cervical tissue* will take place during the week following the operation if too many stitches were introduced, if they were drawn too tightly, and particularly if they chance to cross each other so as to produce strangulation of the intervening tissue. A pallid appearance of the cervix, or of portions of it, most commonly of the lips of the prospective os, immediately after the sutures have been twisted, will foreshadow this occurrence, and demand loosening of the offending stitches. An offensive, sanguineo-purulent discharge several days after the operation may also indicate the occurrence of sloughing, and call for a specular examination to ascertain the facts. If found to be the case, the sutures at fault should be removed, as their presence can only do more harm, and the chance of good union is at the best doubtful. In puffy, unhealthy tissues sloughing may occur and entail a failure of union, without the operator's being to blame.

2. *Menstruation immediately following the operation* has not, in my experience, proved an obstacle to good union, and merely calls for non-interference with the stitches until the flow has ceased. I have already sufficiently discussed this point elsewhere.

3. *Secondary hemorrhage*, occurring at any time between the close of the operation and the removal of the sutures, is a rare accident, and I had performed fully one hundred operations before it happened to me. Then, strange to say, I had two cases of it in the same week, one, particularly, so profuse as to alarm me. In both the hemorrhage was arterial and came on the fifth day. In the first, a private case, I hastily removed the clots through the Sims, intending to search for and if possible compress the bleeding spot with long artery forceps; but I could merely see that the blood flowed in a stream from the external os. Had I had my instruments with me, I should have at once passed a long needle armed with thick wire deeply through the centre of the cervix and have carried the wire around the crown of the cervix and twisted it in front; in this way the whole cervix would have been compressed. But in the absence of the instruments I could do nothing but rapidly pack the vagina full of flat disk tampons, which I had prepared before beginning the examination, and the first of which I covered with powdered alum. Fortunately the hemorrhage was arrested, the tampons were reinserted every second day until the fourteenth day after the operation, when, no further hemorrhage having occurred, the stitches were removed and union was found perfect.

In the second case, which occurred in the hospital, and was one of combined trachelorrhaphy and perineorrhaphy, the hemorrhage was not quite so alarming, but very persistent, and failed to respond to hot alum douches;

finally injections of ice-water and vinegar, equal parts, checked it. Two days later I removed the offensive coagula, with which the vagina was filled, with my finger, and made another vinegar injection, and the hemorrhage did not return. In this case the simultaneous closure of the perineum precluded the use of the speculum and tamponade. Here also union of cervix and perineum was subsequently found perfect, in spite of all the handling. I have seen several cases since of slight oozing during the first forty-eight hours, which have always readily yielded to the hot alum douche. Of course, menstruation should not be confounded with secondary hemorrhage, and can easily be distinguished by the dark color of menstrual blood.

Emmet has had one very severe case of repeated secondary hemorrhage, which finally required the secondary suture. Pallen and Goodell each have had one ; and doubtless others have occurred which have not been published.

Of course the secondary suture, when it encircles the whole cervix, should neither be twisted so tightly as to strangulate the organ nor be left in so long as to cause sloughing ; forty-eight hours would probably be the longest time which it would be safe to leave the suture unwatched or undisturbed. If the hemorrhage is seen to come from one side of the cervix only, of course only that half need be enclosed in the wire ligature.

Pelvic Cellulitis and Peritonitis.—So little reference is made in the books to the danger of this accident following traction on the cervix during trachelorrhaphy, that the reader will be surprised, as I was, to find the result of Dr. Wells' search through recent journal-literature and private sources to be a total of 43 cases (34 cellulitis, 9 peritonitis) with 6 deaths, occurring in the practices of Drs. Hunter (4 with 1 death), Goodell (7 with 3 deaths), Mann (3), Mundé (4 with 2 deaths), Emmet (1), Reamy (6), Jackson (3), and some other operators of equal prominence. The cause of death was in all cases general peritonitis. My two cases occurred in the hospital, and I incline to the opinion that septic infection was the cause of the peritonitis rather than traumatism, since in the first case the peritonitis did not begin until the tenth day, when the stitches had already been removed and perfect union was found ; as it was a case of prolapsus, absolutely no traction was practised on the cervix during the operation. One of my cases of cellulitis was seen in consultation, and is therefore not properly my own case. Here we have 43 cases of pelvic inflammation with 6 deaths in the practices of 15 gentlemen of the highest reputation as gynecologists ! surely sufficient to lead us to observe every precaution against accident, even in this comparatively trifling operation.

Possible Evil Results after the Operation.

1. The evil result which is most likely to occur is the *failure of the lips of the wound to unite,* either wholly or in part.

The causes of such failure are various : Imperfect preparation of the cervix, leaving it in a pulpy, soft, highly hyperemic condition ; imperfect

denudation and coaptation; want of cleanliness of instruments and sponges; too few or too many, crossed, or too tightly twisted, sutures; carelessness on the part of the patient in rising too soon, or straining at stool, or of the nurse (inserting the douche-tube too far); advent of menstruation, resulting in the retention of coagula in, and subsequent forcible expulsion from, the uterus; septic infection, or rather hospitalism; and finally, general debility, producing an anemic, aplastic state of the blood.

Some of these causes of failure will thus be seen to be attributable to the operator, others to the patient, and others again to atmospheric and accidental factors. Those attributable to operator and patient can generally be guarded against and avoided; it is but necessary to refer to each one to at once see its antidote.

The deleterious influence of hospitalism on the healing of plastic wounds can be counteracted only by the most scrupulous antisepsis or by not operating in the hospital when such a tendency seems to prevail. I have had several failures both of cervix and perineum operations in the hospital, after a number of successful operations, when I could positively find no other cause for non-union than the evident reluctance of the tissues to unite, a reluctance which in two cases of perineorrhaphy was, I now think, due to general mal-nutrition of the patient; but in the cervix cases the failure could be attributed to no such cause. Here also the remedy is obvious.

The proportion of failures requiring a secondary operation is about eight per cent. I had 10 failures out of 137 operations. Wells' statistics show 637 operations with 44 failures, or about 6.90 per cent., but this percentage is rather too low, as one operator had only 2 failures out of 110 operations, a result so much better than even Emmet claims, that it must be considered exceptional.

Not every failure calls for a secondary operation, since partial union often ultimately makes a very good result by cicatricial contraction; and if the operation was originally called for by ectropium chiefly, a result which leaves the cervix perfectly, if unevenly, healed, may answer the requirements of that case. If the indication was to remove all cicatricial tissue, why then, of course, nothing but entire absence of such tissue can be considered satisfactory, and the operation must be repeated. If a secondary operation is required, it should not be performed until all the lesions of the first attempt have thoroughly healed, and the cervix is in perfect condition for plastic repair.

2. A further evil result which *may* follow trachelorrhaphy is the *production of sterility*. This supposed consequence of the operation has of late been the subject of some discussion, several operators even claiming, because so few cases are reported of pregnancy after the operation, that it prevents conception. I have already pointed out, while speaking of the good effects of trachelorrhaphy, why it is next to impossible for specialists, who do the large majority of these plastic operations, to keep track of the subsequent history of the large number of patients who are brought to them for advice or operation by other practitioners. Hence the failure of these specialists to report many cases of conception after trachelorrhaphy

can by no means be assumed as an evidence that the operation produces or is followed by sterility. Such an assumption is as absurd as it would be to assert that perineorrhaphy entails sterility, because it is next to impossible to find *statistics* of subsequent pregnancy when searching for evidences of relaceration of the perineum.

It is to the general practitioners that we must look for information on this point. While it cannot perhaps be claimed, on the basis of the 141 pregnancies recorded as having followed the operation in the table of 1,456 cases compiled by Wells, that trachelorrhaphy actually *cures* sterility, it certainly cannot be maintained that these same figures prove that the operation *entails* sterility.

Of the 1,456 cases in Wells' table, only 126 were available, according to him, for the purpose of a statistical deduction of the ratio of conception, since they alone comprised *all* the cases of several operators who kept sight of them and recorded subsequent impregnation. Of these 126 women, 32, or 25.4 per cent., conceived after the operation, surely a very fair proportion, when we consider all the other factors necessary to conception.

The large number of pregnancies recorded, in spite of the imperfect reports of the results of the operation, undoubtedly shows that pregnancy, to say the least, frequently occurs after trachelorrhaphy.

I cannot but think that those operators who find sterility following their operations have but themselves and their methods to blame; if they neglect the caution which I have been careful to emphasize in these pages, and make the external os too small, losing sight of the inevitable cicatricial contraction which follows sooner or later, why, they surely cannot censure the operation, but only their own awkwardness, if temporary sterility happens to ensue.

3. *Obstruction to a future labor from cicatricial tissue*, and

4. *Relaceration at a subsequent labor.*

The same reasons which prevent my giving a large array of figures in proof of the fact that trachelorrhaphy does not produce sterility, apply to these two possible results of the operation.

So far as my own experience goes in the matter, I feel confident that the dilatation of the os at a future labor is very little, if any, interfered with by such cicatricial tissue as may remain from the operation. I have had occasion to examine quite a large number of cervices upon whom trachelorraphy had been performed by myself and others one or more years, more or less, previously, and I have invariably noticed the singular absence of cicatricial induration or nodules in those cases where good smooth union had been achieved. The cicatrix was, in fact, usually scarcely recognizable either by sight or touch. It seems to melt away with unusual rapidity in the cervix. All observers who have had opportunity to notice agree that labor is in no way retarded.

As regards relaceration, in the few cases which I have had occasion to follow through subsequent labors, none but the very least nicking of the lip of the os has occurred, and the testimony of other operators is similar, the universal opinion being that laceration is no more likely to occur after

trachelorrhaphy than in a primipara. Wells' statistics show that of the 77 cases where the condition of the cervix was noted after labor, 62, or eighty per cent., were not relacerated, while of the remaining 15, 8 were but slightly torn.

Possible Results if Trachelorrhaphy is not Performed.

Having now disposed of all that pertains to the significance of laceration of the cervix, to its treatment and cure, and the advantages and possible disadvantages of the radical operation, it but remains for me to discuss the question as to what will be the probable or possible result if the laceration is merely treated palliatively and is not cured by operation.

The answer is a simple one, and has already been given in a measure under Prognosis.

If the pathological changes in the cervix, uterus, and adnexa are of moderate degree, and the symptoms correspondingly slight, palliative treatment will probably enable the patient to exist in comparative comfort until the menopause and its succeeding years bring rest to her sexual organs, and remove them from their active sphere for good and evil. But it should be remembered that treatment will need to be more or less continual, and that it is the exception to see palliative measures in these cases followed by *permanent* improvement.

If the pathological conditions and dependent symptoms are of an aggravated nature, such as are characteristic of large, raw lacerations of the third degree, with subinvolution and hyperplasia, menorrhagia, etc., then palliative means give but slight relief, and the patient will gradually sink into a state of chronic invalidism, from which, if allowed to continue too long, nothing, not even the vaunted trachelorrhaphy, can save her. Of course, eventually, the menopause will here also bring a certain amount of relief, but it will probably take years to recover from the physical and nervous prostration preceding that period.

Finally, the undoubted predisposition to malignant degeneration of the raw, hyperplastic cervix should be carefully borne in mind, a result which may happen at any time until the erosion is permanently healed.

In conclusion, it cannot be denied that occasionally a case of even severe chronic laceration heals spontaneously and all the symptoms disappear permanently without treatment. But this event is so rare as to be poor consolation.

OPERATIONS FOR LACERATED PERINEUM, RECTOCELE, CYSTOCELE, AND PROLAPSUS OF THE UTERUS AND VAGINA.

I have included these several operations under one heading because the accident which produces the first lesion is usually the starting-point and more or less directly the cause of the others, and because the different operations for the cure of these lesions are all based on the same fundamental principle, the narrowing of the vaginal tube and its orifice.

The Secondary Operation for Lacerated Perineum.

Varieties and Degrees of Laceration of the Perineum.—There are three varieties of laceration of the perineum : the *partial*, to the sphincter ani ; the *complete*, through the sphincter ani and more or less up the recto-vaginal septum ; and the *central*, or perforation of the perineum with fourchette and sphincter ani intact.

The partial and the complete laceration may be divided into three degrees, according to the depth of the rent. *Partial*, first degree, is merely a nick of the fourchette down to the bottom or slightly including the edge of the navicular fossa ; second degree, midway to the sphincter ani ; and third degree, to the very edge of the sphincter ani. *Complete*, first degree, through the anterior fibres of the sphincter ; second degree, completely through the sphincter and one to two inches up the recto-vaginal septum, but not through the inner sphincter ; and third degree, through the inner, or second sphincter ani.

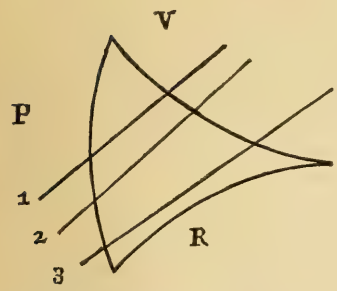


Fig. 255.—Outline Diagram showing Degrees of Partial Rupture of Perineum. V, vagina ; P, perineum ; R, rectum (P. F. M.).

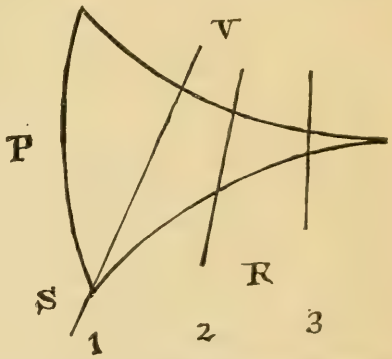


Fig. 256.—Outline Diagram showing Degrees of Complete Rupture of Perineum. S, sphincter ; 3, shows laceration at internal sphincter (P. F. M.).

I have thought it best to make this, perhaps arbitrary, division because the pathological significance and gravity of symptoms differs and increases so much with each degree of the lesion, and because complete rupture produces distress so entirely out of proportion to that caused by partial laceration, that the two varieties ought, at least, to be classified separately. Except as to extent of surface, the methods of operation in each variety, however, differ but little. Not unfrequently in partial ruptures the rent separates at the sphincter and extends like an inverted ⊓ on either side of that muscle.

Frequency.—Ruptures of the perineum of the partial variety and first degree probably occur in three-fourths of all primiparæ. If a woman has escaped a laceration of the fourchette in her first labor, she probably will not undergo it at a subsequent confinement. Still, occasionally the perineum remains absolutely intact at the first labor, and an unusually large size of the child, a very rapid or instrumental labor, or carelessness, may at a subsequent labor cause a laceration.

Partial laceration of the second and third degrees probably occurs in about one-quarter of all primiparæ.

In what proportion complete laceration of one degree or the other occurs, I am unable to say. I have seen many such cases, but as all but two were chronic cases I cannot form a fair estimate as to their frequency. Fortunately they are infinitely more rare than the partial ruptures. While the latter are usually caused by the size or rapid passage of the child's head or shoulders, the complete ruptures are generally caused by the precipitous extraction of the head with forceps in the hands of a careless or unskilled operator. The partial ruptures, therefore, can often be avoided; the complete should really never occur, except under quite unusually difficult conditions.

Anatomical Relations and Diagnosis.—In partial lacerations the mucous membrane of the vaginal orifice, the muscular aponeurosis constituting the so-called "perineal body" (transversus perinei superficialis and profundus, constrictor cunni), the superficial fascia, the subcutaneous cellular tissue, and lastly the skin (occasionally the skin cracks first) are torn, but the recto-vaginal septum remains intact. Instead of the vagina terminating at the fourchette, it now ends at that point of the external skin at which the rent stops; the vulvar fissure is lengthened backward. When cicatrization takes place, the hyperplastic mucous membrane of the posterior vaginal wall is often drawn down and out by the contraction of the cicatrix, which separates the labia majora and causes the vulvar cleft and, beyond it, the vaginal orifice to gape. If the rent extended some distance up into the vagina, which is frequently the case, or if it was slightly lateral instead of, as usual, in the median line, distortion of the posterior vaginal wall and remnant of perineum by cicatrization may take place. The size and shape of the cicatrix is recognized by the shiny, smooth character of the vaginal orifice, and by the fringes of tissue which often ornament its borders. In women who have had a number of very severe, protracted labors, with enormous overdistention of the perineum, a condition of that body is not infrequently met with which practically corresponds to its destruction by laceration. That is, the overdistended perineal muscles never regain their tone, the fascia remains flabby and pendulous, and the perineum might as well be absent for all the support it gives to the vaginal and rectal walls. This paralysis of the perineum has by some gynecologists, perhaps with reason, been attributed to a "sundering" of the muscles from their central aponeurosis, leaving only the skin and mucous membrane without and within, with perhaps some cellular tissue and fat, to represent the firm, muscular, elastic perineum of health. Very commonly the vaginal walls participate in this relaxation.

The appearance of a complete rupture is even more striking and characteristic than that of a partial rent. According to the length of the laceration of the recto-vaginal septum, a more or less deep notch is seen in place of the anterior arch of the sphincter ani, through which notch, if the rent is a deep one, the scarlet mucous membrane of the rectum often protrudes. This notch is generally in the median line, although cicatricial

contraction may occasionally draw it slightly to one side. The torn ends of the sphincter are imbedded in and covered by shiny cicatricial tissue at either side of the gaping anus, the rugous margin of which, instead of radiating toward the central orifice as in health, is more or less horizontal, even somewhat everted if cicatricial retraction has been very marked. Thick rugous folds of vaginal mucous membrane, often bound down laterally by flat cicatrices, the result of sloughing after labor, may overlap the edges of the rent in the lesser degrees; if the fissure extends up to or above the internal sphincter, its edges are generally sharp and thin.

Occasionally an attempt at primary union is shown by a band of tissue, uniting the edges of the fissure, leaving a recto-vaginal fistula above. Large, deep cicatricial adhesions often extend up into the vagina on one side or the other (usually the result of fissures made by the forceps), perhaps dragging down, fixing, or distorting the uterus, and attaching the vaginal walls to the pelvic fascia.

It is evident that in large lacerations (partial and complete) with abundant thick cicatricial tissue the latter itself separates the labia and causes the vaginal orifice to gape.

From the above description the *diagnosis* between partial and complete laceration can easily be made, and the extent of the injury ascertained, if need be, by passing the index-finger into the rectum and the thumb into the vagina, when the exact amount of remaining perineal tissue is grasped.

In deciding upon the extent of the injury, the possibility of approximating the edges of the rent, or of the torn sphincter ani should be ascertained with a view to a restorative operation.

The existence of a central laceration is easily detected: an irregular opening with cicatrized borders communicates with the vaginal, canal generally but a short distance above the entrance, forming a perineo-vaginal fistula.

Pathological Results of Laceration of the Perineum.—The most frequent and natural result of the destruction of the strong, elastic combination of muscles, fascia, skin, and mucous membrane, known as the "perineal body" or "triangle," is the gradual descent of the posterior and anterior vaginal walls, which are supported by the perineum, and secondarily of the uterus, which is in a measure sustained by the vaginal walls. Together with the vaginal walls comes down the contiguous portion of the rectum—rectocele—and of the bladder—cystocele—either or both, sometimes the one, at other times the other taking the lead. There are two gradations by which this descent of vagina and uterus takes place.

1. The loss of the perineum leaves the posterior vaginal wall unsustained, it gradually slides down, relaxed and subinvoluted as it generally is after a severe labor; in consequence the uterus, deprived of its support little by little, partly tips, partly is drawn backward and downward, and enters into the first stage of prolapsus and one of the three stages of retroversion. Then ultimately, but not necessarily, the anterior vaginal wall, which has all this time steadily resisted the absence of its natural support in the erect position, the lower part of the posterior vaginal wall

and perineum, is forced down by the varying pressure of the elastic bladder, and with it drags down the already partly prolapsed uterus. And we thus have 1, rectocele ; 2, descensus and retroversion ; 3, cystocele ; and 4, full descensus uteri.

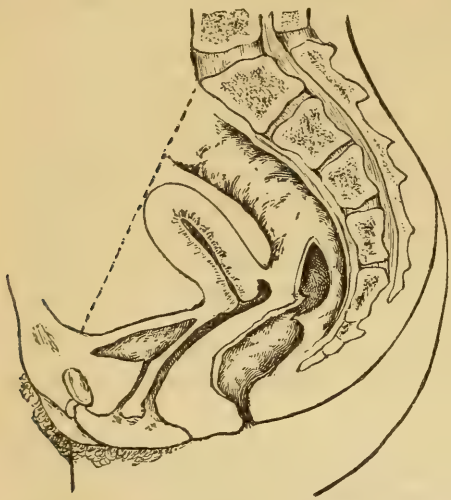


Fig. 257.—Normal Relations of Female Pelvic Organs, showing Perineum Supporting Vagina, Bladder, and Rectum (P. F. M.).

2. The other series of steps by which the same result is obtained, begins with the anterior wall, which, deprived of its support sags down, together with the adjacent portion of the bladder, and drags down the uterus with it. We then have cystocele and descensus, with anteversion as yet, *not* retrodisplacement of the uterus. Then, eventually, the posterior vaginal wall begins to prolapse, the uterus is dragged down still more, and the fundus retires in the only direction where it has room, namely, backward. We thus have precisely the same result as in the first series. It must not be supposed, however, that we invariably have all these sequences of a lacerated perineum in the same case, or indeed that we must inevitably have any of them. On the contrary, most frequently we find only a rectocele with retroversion and descensus ; next, a cystocele with descensus of the uterus ; with equal frequency, perhaps, a rectocele and cystocele with descensus and retroversion ; and most rarely a descensus of the first or second degree without prolapsus of the vaginal walls. In the latter instance the abnormal weight of the uterus (generally due to subinvolution) simply tires out its ligaments and allows it gradually to sink down until the cervix touches the floor of the pelvis, without there being any involvement of the vaginal walls. It is simply in the one case a dragging from below, in the other a sinking from above. Why in one case a rectocele, in the other a cystocele, and in the third a combination of these two conditions should be the predominating feature, it is not always easy to determine.

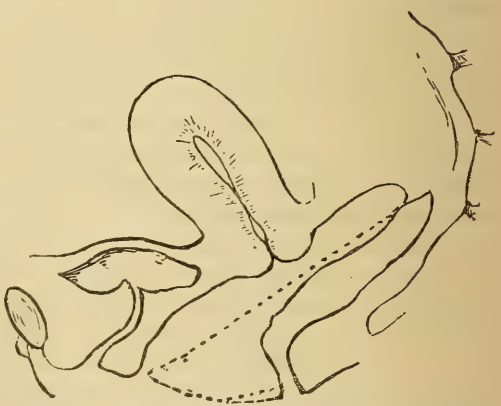


Fig. 258.—Absence of Perineum, showing Bladder and Vagina without Support. Dotted line shows normal posterior vaginal wall and perineum (P. F. M.).

As a rule, it is safe to assume that the deeper the rent the more certain and distressing the symptoms, chiefly the descensus. But cases are occasionally met with where even a partial laceration of the third degree is unattended, even after many years, by the least falling of either vagina or uterus. This anomaly can perhaps be explained by an exceptional firmness of the vaginal walls and suspensory ligaments, as well as by thorough involution of the uterus. Stranger still, in complete rupture, in even the worst cases, prolapse of vagina and uterus is rather the exception, although prolapse of the rectum is a common feature. This apparent improbability can be very plausibly explained by the fact that in these very bad ruptures there has usually been some plastic infiltration into the perimetran cellular tissue or the broad ligaments, or some cicatricial induration of the vaginal walls, which prevents descensus. Besides, the cicatricial retraction of the sphincter ani and posterior vaginal wall may act as a sort of barrier to a protrusion of the vagina.

Other pathological results, besides prolapsus of the vagina and uterus, which are entailed with more or less uniformity by a lacerated perineum are: Subinvolution of the vaginal walls, a gaping of the vaginal orifice, and, as a consequence of the latter, leucorrhea, entrance of air into the vagina, dyspareunia, and sterility.

Subinvolution of the vaginal walls is but the natural result of the interference with circulation and nutrition of those parts induced by the laceration and the efforts of nature to repair it by granulation and cicatrization. The subinvolution manifests itself by the thick, redundant condition of the vaginal wall, by a hypertrophy of the normal rugæ, and a protrusion of the bulb of the urethra simulating cystocele and of the posterior wall simulating rectocele. These protruding folds attract the attention of the patient, who takes them for a "falling of the womb," and they annoy and distress her by becoming eroded through leucorrhea and friction; finally, if there be a true cystocele or rectocele besides, the redundancy of the vaginal wall increases the size of the protrusion and the dragging weight on the uterus.

The true or false rectocele or cystocele separates the labia majora when the patient is erect; and if there be a firm cicatrix at the site of the rent, this separation is constant, whatever the patient's posture. The vulvar cleft and vaginal orifice are thus made to gape, and the vaginal tube is more or less exposed to the entrance of air and dust. I have seen even slight partial lacerations, of not more than the second degree, produce this effect when the cicatrix happened to be a broad one. The result of the entrance of air and dust into the vagina is the production of a profuse irritating discharge which soon excoriates not only the vagina itself but also the labia.

Another unpleasant, if not serious consequence of this gaping is the entrance and *retention of air in the vagina*, while the patient is in the recumbent or semi-prone position, or when she happens to stoop forward, and its expulsion with an audible noise when the erect or any posture is assumed in which intra-abdominal pressure again asserts itself. This phe-

nomenon has been designated by the Germans by the expressive term "*garrulitus vulvæ*," talkative vulva, and may cause exceeding annoyance to the woman if she happens to be in company, who, of course, imagine the flatus to be from its usual source, the rectum.

As a result of the cicatricial covering of the posterior commissure and the gaping of the vulva, we have *painful* (chiefly in the minor degrees of partial rupture, when the penis rubs against the tender scar) or *unsatisfactory coition*, the separated labia and gaping orifice diminishing the friction necessary to perfect intercourse. In the one case the sexual act is dreaded by the wife, in the other it is not enjoyed by the husband, and the consequence may easily be marital disagreements and infelicity. As the outcome of these two forms of dyspareunia, and more still, in consequence of

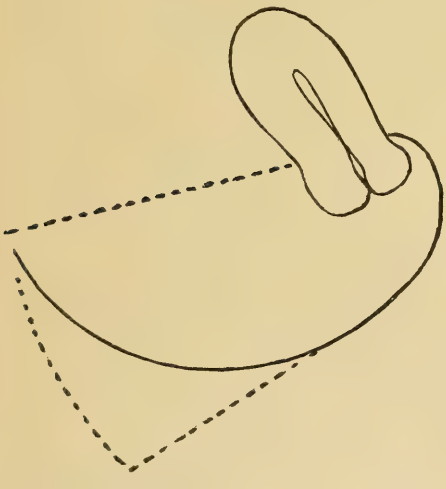


FIG. 259.—Normal Curve of Posterior Vaginal Wall (P. F. M.).

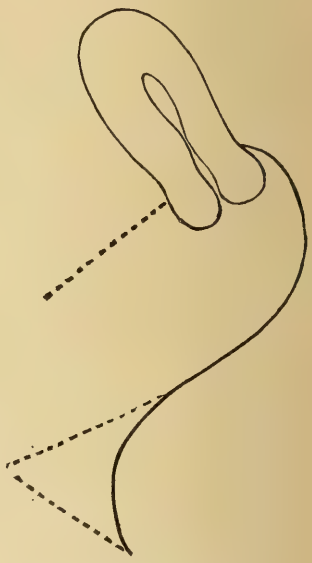


FIG. 260.—Abnormal Curve of Posterior Vaginal Wall after Laceration of Perineum (P. F. M.).

the non-retention of the semen in the vagina after intercourse, we have *sterility* in a certain proportion of cases of lacerated perineum. The existence of a profuse, acrid leucorrhea, which kills the spermatozoa, perhaps associated with a cervical catarrh, aggravates the condition. To understand how it is that absence of the perineum may produce sterility, one has but to compare the relation of the proper curve of the posterior vaginal wall and perineum to the external os (Fig. 259), to that existing when the perineum has been destroyed (Fig. 260). In the normal condition the cervix dips down into the deepest portion of the vaginal tract, in which by law of gravitation the semen naturally accumulates in the recumbent position after withdrawal of the penis. The external os is thus bathed, as it were, in the semen, and, if impregnation does not take place, it is not for the want of opportunity. This pouch of the vagina has been

called by Sims, who first advanced this theory, the *receptaculum seminis*, and the pool of semen in it, the *lac seminis*.

Now let the perineum be destroyed, and instead of the normal ∪ curve, the posterior vaginal wall curves downward toward the anus, like an S, and it is obvious at a glance that the receptaculum seminis is absent, and that the withdrawal of the penis must be at once followed by the gliding out of the semen down the inclined plane of the S. And, indeed, this is what patients almost invariably report when they consult a physician for acquired sterility, and the perineum is found absent.

While theoretically, and in many instances practically, this explanation is sustained, there are, doubtless, more cases in which absence of the perineum is not accompanied by sterility. But this may be explained by the occurrence of ejaculation directly into the, in such cases often, gaping cervical canal, and by the mysterious fact that, no matter what lesion of the genitals, short of actual atresia or absence of ovaries, they may have, nothing seems to prevent a certain proportion of women from becoming pregnant.

Thus far I have described merely the results of partial laceration. In addition to the evils mentioned, *complete rupture* has peculiarly distressing features of its own, the chief of which is more or less incontinence of the contents of the rectum, and in course of time a catarrhal inflammation of the lower portion of the bowel due to exposure.

Absolute incontinence of fecal matter and flatus occurs only when the rent extends through the internal sphincter. If the fissure is only through the external sphincter ani, solid feces can almost always be controlled, and often thin evacuations also, if the rectal mucous membrane is not inflamed or irritable. Flatus, however, is usually not under control when the external sphincter has been completely severed. Partial fissures of the external sphincter, involving only the outer fibres and leaving the inner fibres intact, do not affect the faculty of retention. In complete ruptures, retention may be greatly improved by cicatricial contraction of the lower extremity of the rectum, or by bands stretching across the fissure. The presence of hemorrhoids, external and internal, generally aggravates the irritability of the rectum.

Many patients with complete rupture are perfectly comfortable and have entire control unless diarrhea happens to set in, or some mental excitement brings on an unexpected evacuation. Then they are liable to an involuntary movement at any time or place. When the laceration extends above the internal sphincter, absolute incontinence is the rule, and such patients are among the most deplorable objects, short of those afflicted with cancer, which it is our fate to meet. Even a woman with a vesico-vaginal fistula is not such a burden to herself and a horror to others.

Oftentimes the catarrh of the rectum extends upward, and colitis, with severe colic and diarrhea, intensifies the already sufficiently deplorable state of the patient.

Why these large complete ruptures are not followed in proportion by prolapsus of the vagina and uterus, I have already explained.

Treatment.—I have already made the statement that, if the practice were universally adopted, as it should be, to unite all lacerations of the perineum of greater depth than the first degree immediately after their occurrence, the cases coming under the care of gynecologists for the secondary operation would scarcely be one-fourth of the number now met with. It is true that a certain proportion, perhaps one-third, of these primary operations must be failures (this is unquestionably too large a proportion for private practice, although in hospitals it is about correct); and again, it occasionally happens that even quite a deep tear unites spontaneously with no other treatment than tying together the knees and the lateral position. But, while union after the primary operation is the rule, and union without operation the exception, there are still a fair number of practitioners who are either too timid to admit that they have allowed a perineum to tear (an accident which even the most skilful cannot always prevent), or so ignorant and careless as to neglect ascertaining whether it has taken place. These last are the men who "have never had a lacerated perineum in a practice of thirty years" (*sic!*). Others again, I am happy to say less numerous, are so wilful and illogical as to claim that the immediate suture of a perineal laceration is injurious, as septic elements might be included in the wound and be thus removed from disinfection (*sic!*), little thinking how much greater the danger of infection is from the lochia flowing over the open perineal wound.

There is but one valid exception to the immediate closure of a large perineal laceration, and that is when the rent extends so far into the rectum as to render the operation, in the exhausted condition of the patient, too hazardous. In such a case, the patient may be given twelve to fifteen hours to rally, and if then still found impracticable, the operation had better be deferred until involution has taken place. To postpone all immediate operations for twelve or twenty-four hours, as has been proposed, is simply trifling with the chances of union.

As I have often noticed the interest excited in my audience when I took occasion to describe the method usually employed by me in the primary suture of this lesion, I will crave indulgence to go slightly out of my way and briefly describe the

Primary Operation.—In every primiparous labor, as soon as the placenta is expelled, I insert the index-finger into the rectum, and the thumb into the vagina, and between the two estimate accurately whether and how deep a laceration has taken place. For the sake of verifying the result thus obtained, I then thoroughly expose and cleanse the vulva, and by a good light separate the labia and satisfy myself of the full extent of the tear, and whether the sphincter ani or the posterior vaginal wall is involved or not. By approximating the labia I also estimate the length of the rent with the parts in their natural relation, for it must be remembered that the swollen, discolored appearance of the gaping vulva is liable to distort reality and to magnify a tear. Having now found that the rent is one of the second degree, at least; that it is not superficial, but involves the whole substance of the perineum (as, indeed, such rents usually

do), I at once inform the patient's friends of the fact (the possibility of which I am always careful to impress upon them during every primiparous labor), and instructing the nurse to maintain contraction of the uterus by gentle friction, I proceed to prepare my instruments in an adjoining room. These consist of a stout, flat needle, three and a half inches long, with bilateral cutting edges, curved so that from point to head the distance is but two and a half inches (Fig. 219); a small needle-holder which I always carry in my pocket-case, and No. 2 braided silk, dipped in five per cent. carbolic solution when used. Having threaded the needle with sufficient silk to last for all the stitches probably required, I proceed to the bedside, and quietly inform the patient that she is slightly torn and will require a stitch or two, which will hurt her but very little. If she grows nervous and objects greatly, I let the nurse give her a few whiffs of chloroform on a handkerchief, all the while keeping her hand on and rubbing the fundus uteri, the patient lying on her back, and as soon as practicable I turn the patient crosswise in bed, and bring her hips well down to the edge, with her feet resting on the bed close to the hips. I now compress the uterus gently but firmly, in order to expel any coagula or fluid blood which it may contain, and again intrust its care to the nurse. A disinfected sponge of about the size of an apple (not larger, as it is difficult to remove later on) is now placed in the vagina, to absorb blood and prevent it soiling the rent. I take my place outside of the left thigh of the patient and (being right-handed) pass the index-finger of my left hand into the rectum. The right thigh is supported by an assistant, whoever it may be, and I manage to control the left thigh with my body. Or, if the assistant is strong enough, he or she can lift both feet with flexed knees and thighs into the gluteo-dorsal position, and thus give me uninterrupted approach to the vulva. With my left index-finger in the rectum as a guide, I insert the point of the large needle, which is firmly grasped in the needle-holder, about one-fourth of an inch to the right of the bottom of the rent, and with a quick sweep carry it completely under the rent, emerging at a corresponding spot on the left side; the second needle is passed in precisely the same way, and so on, until the fourchette is reached, where the uppermost suture must lie. Particular care must be taken to have the sutures all outside and under any rents which there may be in the vaginal wall, such as are most liable to happen along the descending rami of the pubic arch, and not to allow the suture to escape from the tissues during any part of its course. It is rare that a partial rent of the third degree requires more than four sutures. Having inserted all the sutures, the wound is thoroughly cleansed, and, beginning with the first, the stitches are tied with the knot slightly to the side of the rent, until the uppermost is reached, when the sponge is removed, and the last stitch rapidly tied. The sutures are cut off about one-fourth of an inch from the knot. If the vagina should happen to be torn some distance up, it would be well to sew this rent with a finer needle and fine catgut (running suture), down to the perineum, and then unite the latter as described. I have, fortunately, had but one opportunity to sew a complete rupture immediately after its occur-

rence, and in that case I proceeded precisely as I have related, it being a slight case, including the edges of the torn sphincter in my first stitch, and obtaining union by first intention. In another case of complete rupture of the second degree, which I saw in consultation forty hours after its occurrence, I gave but little hope of union at that late hour, but operated, at the request of the friends, with silver sutures introduced as to be described for the secondary operation; owing to hyper-catharsis union was not obtained.

In complete laceration involving the septum, I should first unite the rent in the latter separately, knotting the stitches in the rectum and cutting them short, and then proceed as in partial laceration. The rectal stitches can be allowed to cut out, or catgut may be used.

The stitches after primary operations are removed on the fourth or fifth day, the ordinary daily vaginal douches having been given and the bowels moved by compound licorice powder or Hunyadi water aided by enema on the third day, in the hands of a competent nurse. In complete lacerations this first movement of the bowels requires the most careful attention, and the physician would do well to be present and administer the enema himself. More detailed rules for this manipulation will be given later on.

Of late, Dr. Alloway, of Montreal, has advocated closing fresh lacerations by *one* wire suture passed as near as possible all around the upper margin of the rent, and twisted on the skin. He claims that this single suture closes the whole tear, and that entire primary union is the rule. His experience is corroborated by Dr. Lee, of Cleveland, Ohio, and the plan seemed so plausible, while it spares the patient the suffering of more stitches, that I have employed it in two cases of moderate partial rupture with perfect success. Dr. B. F. Dawson, of New York, informs me that he has lately adopted the same principle successfully in the secondary operation. If found generally efficient, this single suture would certainly be a great improvement.

If the primary operation has been neglected or has failed, no other course remains but to wait until complete involution has been accomplished, and then, if the symptoms demand it or delay is likely to be productive of evil results such as I have described, to perform the secondary operation.

The Indications for the Secondary Operation must be sufficiently apparent from what I have said of the symptoms and evil results of the injury. As to the advisability of restoring every perineum torn to or through the sphincter ani, there can be but little dispute, none at all, indeed, when the rupture is complete.

Whether minor partial lacerations should be repaired depends mainly on the severity of the symptoms produced by them (dyspareunia, sterility, rectocele, or cystocele), and partly on the desire of the woman to be as nearly perfect as possible in her genital organs, as in other respects. It is as easy to exaggerate the indications for perineorrhaphy as for trachelorrhaphy, although there can be no question as to the propriety of closing a well-marked perineal laceration.

In a case of so-called "sundering" or paralysis of the perineal mus-

cles, the question must be weighed as to whether it is worth the risk to split the perineum and endeavor to restore its tone by narrowing the vaginal orifice. As a rule, I should hesitate to do this, since there is usually in such cases so little elasticity left in the tissues as to preclude the possibility of their ever regaining their tone. I should prefer to narrow, and have done so successfully, the whole posterior wall of the vagina, as will be described for prolapsus, or by performing Emmet's new operation described on page 505.

Object of the Secondary Operation.—In performing a plastic operation on an old perineal rent, the object is not only to restore the perineum itself to its original integrity as nearly as possible, and to give to it again its function as the support of the vagina, and through it of the neighboring organs, but also so to influence the vagina itself as to overcome whatever dislocations of that canal may have gradually developed, such as rectocele, cystocele, and in a secondary line, descensus of the uterus. Accordingly as the operation is confined to the perineum, or is extended to the posterior vaginal wall, it is called simple perineorrhaphy, or colpo-perineorrhaphy. The operation for cystocele, or anterior colporrhaphy, does not properly belong to this chapter at all, but will be considered separately.

Perineorrhaphy, then, aims to bring together the long-separated halves of the torn perineum; colporrhaphy, to narrow in a longitudinal direction the vaginal canal, whether this be on the posterior or the anterior wall. A firm posterior cicatrix extending from the perineum to, or nearly to, the cervix, and supported by a solid muscular perineum below, will evidently accomplish the object of preventing a return of the vaginal prolapse. Whether it does so permanently for the uterus remains to be seen.

Brief History of Secondary Perineorrhaphy.

Although many operators from the time of Ambroise Paré attempted this operation, but few succeeded in obtaining even partial results, until Roux, in 1832, by means of the now abandoned quill-suture, cured four out of the five cases on which he operated. Dieffenbach and Langenbeck, in Germany, were also fairly successful, Since then, with some intermissions, the operation has gradually been improved upon, that is, simplified, chiefly by Simon in Germany (who used silk exclusively), Baker Brown in England, and Sims and Emmet in America, until now it has become one of the ordinary and most successful operations in gynecological surgery. The peculiarity of the operation is that nearly every operator of repute has felt stimulated by it to devise some special modification which is thenceforth known as *his* operation, and as a result the number of methods for operating on old perineal lacerations, chiefly when combined with prolapsus of the uterus and vagina, has increased so greatly within the last few years that it is absolutely impossible to remember them all, let alone spare the space to describe them. Doubtless each has its advantages, or it would not have been devised. But I have found from my own experience that, when the case presents complications, each operator

does best to adopt for himself the method to suit his particular case. And comparing these various methods, I have arrived at certain conclusions as to which plan of operation is usually the most successful in a certain form of lesion ; and these I shall describe in these pages, making the details as clear and as simple as possible, and referring briefly here and there to other methods which may seem useful at times.

The methods of operation, then, which I shall describe will be those which I have found most successful in my own practice. Essentially they are those of Emmet and Thomas, combined with those of Simon and Hegar.

Preparatory Treatment for Perineorrhaphy.

It is the exception to find an old laceration of the perineum in need of preparatory treatment for operation. The rent has cicatrized over, and such redundant tissue as there may be, either about the anus (hemorrhoids, folds of skin) or in the vagina, is removed most easily and rapidly at the operation. Only in case there is considerable prolapsus of the vagina and uterus, may it be advisable to retain these parts in position by astringent tampons or a pessary, if there is time for such palliative measures.

The attention to be paid to the establishment of the general health before operating has already been referred to. One point of special importance, particularly in complete lacerations, is the care of the bowels, which for at least a week before the operation should be regulated by mild laxatives (compound licorice powder, compound rhubarb pills, or equal parts of sulphur, magnesia, and cream of tartar), so as to have two full evacuations daily. I have been surprised to see the amount of fecal matter evacuated from bowels which were supposed to be regularly moved every day, and it is exceedingly annoying as well as detrimental to the success of the operation to find the rectum filled by soft pultaceous fecal matter several days after the operation, when the upper intestine was supposed to have been thoroughly unloaded immediately beforehand. Only by mild preparatory catharsis for one or two weeks can a thorough clearing out be achieved. The last evacuation by laxatives should take place on the day before the operation, or at the latest in the morning if the operation is to be done in the afternoon. An hour before the operation a full enema of soapsuds should be given to make sure that the rectum is well emptied.

Hyper-catharsis is almost as bad as the reverse, for it is anything but pleasant to see (and smell) a gush of liquid feces spurting or oozing from the anus under the expulsive efforts of ether-retching during the operation, not to mention the danger of contaminating the wound. In case this occurs, a plug of cotton or a sponge may be inserted into the rectum as a protective ; but I once saw plug and feces together forced out, narrowly missing my face.

Light but nutritious diet should be given for a week prior to the operation, and milk is to be avoided, as it leaves caseous excreta. Immediately before the operation, a *hot* carbolized vaginal douche is given.

Instruments.—We in this country greatly prefer scissors to knives in denuding a perineum; the denudation can be made more rapidly and superficially, since it is not necessary to remove pieces of fascia and muscle but only the mucous membrane and cicatricial tissue in order to get a raw surface for primary union, and the wound heals quite as readily as that of a knife. The advantage claimed for the scissors, of causing less hemorrhage because the tissues are more or less bruised, is, I think, a fancied one. Sharp scissors bruise but little, if any. The scissors usually employed are slender, bent at an obtuse angle to the shaft, right and left, slightly curved

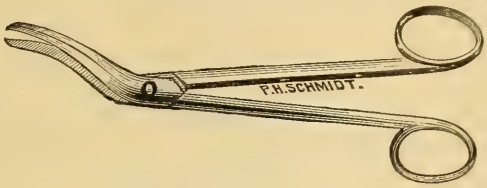


FIG. 261.—Emmet's Perineum Scissors.

on the flat, with moderately sharp points (Fig. 261). The tissues to be removed are grasped and lifted up, seriatim, by a tissue forceps of Thomas' invention (Fig. 262), or by a tenaculum, preferably the forceps. The needles are straight, round darning-needles, two inches and one and one-half inch long. Needle-holder, shield, twister, etc., are the same as in cervix operations. Wire No. 26 or 27, and No. 33 for superficial sutures. At least six needles, four long and two short, and ten wire sutures, 10 to 12 inches long each, should be prepared for each operation.

Assistants.—Four assistants and a nurse are required; one to give the anesthetic, two to hold each a knee and sponge, and the fourth to hand instruments, attach wire, thread needles, etc. The nurse washes the sponges.

The apparatus recently imported from abroad, by which the knees and hands are joined immovably, and the patient is kept in the gluteo-dorsal position without the two assistants for the legs, is very useful for lithotomy, no doubt. But for perineorrhaphy it does not answer so well, because the duty of these two assistants is not only to hold the legs of the patient, but

FIG. 262.—Thomas' Tissue Forceps.

also to separate equally the labia during every step of the operation, especially when the operator reaches the angle inside of the rami of the pubes. If this is not done, and well done, the denudation will either be imperfect or asymmetrical.

Position of Patient and Operator.—The gluteo-dorsal, with external genitals at the very edge of the table, the knees bent on the abdomen and supported by the corresponding arms of the assistants, who, if they become tired, may pass the patient's legs over their necks and support them in that position.

The patient must lie perfectly flat on her back, so as to have both sides of the vulvar cleft on an even level. The best of light is, of course, imperative.

The operator sits immediately in front of the patient, directly in the median line.

The Operation of Secondary Perineorrhaphy.

For Incomplete Laceration.—The patient having been placed carefully in position the operator traces the outline of the cicatrix indicating the original perineal wound, and by approximating the labia ascertains how much surface he must remove in order to insure thorough coaptation.

The novice must remember that it is not only the cutaneous surface of the perineum which he wishes to restore, but the whole triangular mass, known as the "perineal body" (see Thomas' "Diseases of Women," pp. 155 to 168); and that the denudation must accomplish that object. It must

Fig. 263.—Cicatrix of Lacerated Perineum. Third degree (P. F. M.).

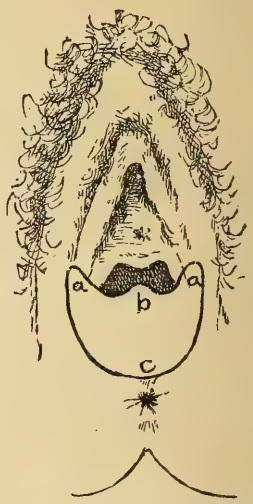


Fig. 264.—Shape of Denudation for Laceration in Fig. 263 (P. F. M.).

therefore extend upward along the posterior vaginal wall, outward on each labium, and backward toward the anus, as far as the cicatrix shows the original perineum to have been torn. Fig. 263 shows the usual appearance of the cicatrix of a partial laceration of the third degree. Just so large, and to make union more certain, a little larger in every direction, must be the denudation.

From the accompanying diagrams the shape and limit of the area of denudation will be apparent. It resembles the body with wings extended of a bat or butterfly, the two lateral triangular spaces being the wings and, meeting in the centre, the body. If the rent is a comparatively superficial one and does not extend up into the vagina, or there is no rectocele, the

denuded area has the shape of Fig. 267. But if there is a rectocele, the body of the bat projects upward as in Fig. 268. The difficulty with students generally is (it certainly was with me) to understand why the upper border of the denudation should be concave on either side of the median line, and project in the centre. The explanation lies in the fact that the vagina is a tube, and that while the denudation on the labia *a a* is on the same level as the limit of the denudation on the posterior vaginal wall *b b*, the natural curve of the vaginal tube brings the point *c c* at a lower level. If the vagina were a flat surface, the points *a*, *c*, *b*, and *b*, *c*, *a* would be on the same plane. The higher up on the posterior vaginal wall the vivification goes, the deeper the grooves *c c*.

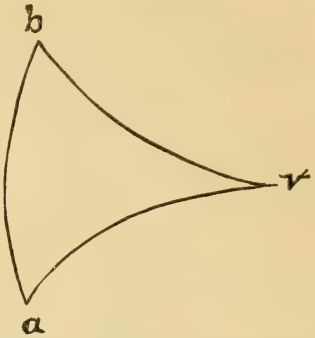
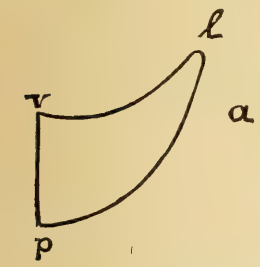


FIG. 265.—Section View of Perineum. *a a*, rectal surface; *a b*, perineal surface; *b v*, vaginal surface (P. F. M.).

The object of the operator must be to so denude the lateral halves of the perineum and the posterior vaginal wall as to bring *a* and *a* in Fig. 267 and *a* and *a*, and *b* and *b*, and *d* and *d* in Fig. 268 in accurate apposition



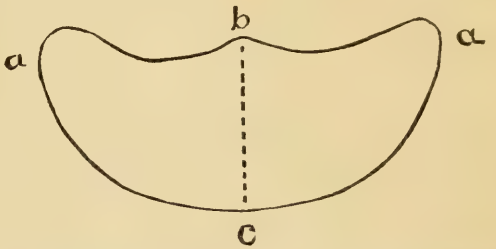


FIG. 267.—Shape of Area of Denudation for Partial Laceration. Second degree. *b*, *c*, show the median line; *a a*, the points on the labia to be united (P. F. M.).

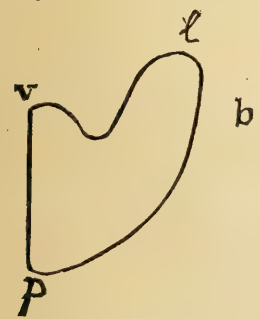


FIG. 266.—*a*, One-half of Area of Denudation without Rectocele. *b*, one-half of area of denudation when the laceration is a deep one, with rectocele; *v*, vagina; *p*, perineum; *l*, labium (P. F. M.).

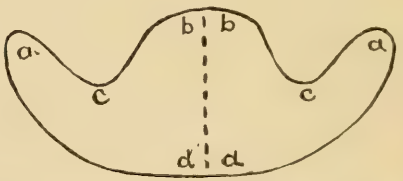


FIG. 268.—Shape of Area of Denudation for Laceration of Perineum with Moderate Rectocele. *a*, *a*, labia majora; *b*, *b*, rectocele, or posterior vaginal wall; *c*, *c*, lateral vaginal furrow; *d*, *d*, perineum (P. F. M.).

when the sutures are twisted. The median line *b*, *c* then constitutes the raphé of the new perineum, precisely where that of the original perineum existed, and the points *a*, *b*, *a* united are the posterior commissure.

In beginning the operation the novice may do well to trace out the limit of the space to be denuded by trimming off a narrow strip of mucous membrane from the inner side of the left labium majus at *l* (Fig. 266, *a*) to the bottom of the rent at *p*, and then up the middle of the posterior vaginal wall to v, and back to *l*. In this way a triangular-shaped space will be included in three bleeding furrows, and the enclosed mucous membrane can then be trimmed off, and the same is subsequently done on the other side, and the two bleeding triangles are joined to make the wound represented in Fig. 267. Thomas illustrates this step very neatly by cutting two triangles like Fig. 266, *a*, out of paper, and joining them in the centre by pasting linen on both sides. The open flaps will then represent the area of denudation, and when approximated they illustrate the union of the perineal flaps by sutures. Even the expert will do well to mark the spot on the posterior vaginal wall which shall be the limit in that direction of the denudation, a spot which he determines by lifting up with a tenaculum the highest point of the mucous membrane there which he can carry without force to a level with the upper limit of the original perineum on the labium majus (about half-way between anus and meatus urinarius) and snipping out a little speck, which he can recognize when denuding. This guide will prevent too high a denudation.

A study of the foregoing description and comparing it with the diagrams, must, it seems to me, render the comprehension of this operation an easy matter. I will now proceed to describe the technical details. Having traced out in mind or by a bloody furrow the limits of the area of denudation, as marked by the border of the cicatrix and the slight wound made on the posterior vaginal wall as just described, the operator with the tissue forceps seizes a superficial fold of mucous membrane on the inside of the left labium majus at the point (Fig. 264, *a*) which he has chosen for the future posterior commissure (usually about midway between meatus and anus), and with the left-bent scissors trims off a strip of tissue which is partly skin and partly mucous membrane down to the bottom of the rent (*c*) nearest the anus, and up on the right labium until he reaches a spot (*a*) corresponding to *a*, when he cuts off the ribbon-like flap, which he has trimmed off. He may now, if he is ambidexter, take the right-bent scissors and retrace his steps to the left side, then back to the right, and so on, lifting up the beginnings of each ribbon with the tissue forceps or tenaculum, and endeavoring not to break the strip from side to side, until the upper limit of the denudation is reached. The novice will fear that he may cut through the septum into the rectum ("buttonhole" it), and so he might if he cuts too deeply, picks up too much tissue in the forceps, or uses a scissors too sharply curved on the flat. But if he is careful always to keep Emmet's flat scissors level with the surface so that only the mucous membrane can be trimmed off, and if he always sees just what and how much tissue the blades enclose before he cuts, he will not do any damage. Large veins, which are numerous in the recto-vaginal septum, can be seen and avoided, especially if the ribbon be always held taut with the forceps. If the ribbon breaks at any spot, the tissue forceps must take a fresh bite,

and the paring goes on. The width of the strip of skin or mucous membrane which can easily be peeled off at each trip from side to side is about one-fourth of an inch. It is evident thus that a rapid and skilful operator can denude a space often measuring four inches from *a* to *a*, and three inches from *b* to *c*, in a comparatively short space of time, say twenty minutes to half an hour.

If an arterial branch or a vein is cut, which occasionally happens, it is simply seized with artery forceps, which are allowed to hang until the denudation is finished; the artery is then twisted, the vein will probably have ceased to bleed without this, and any remaining hemorrhage promptly stops when the sutures are twisted.

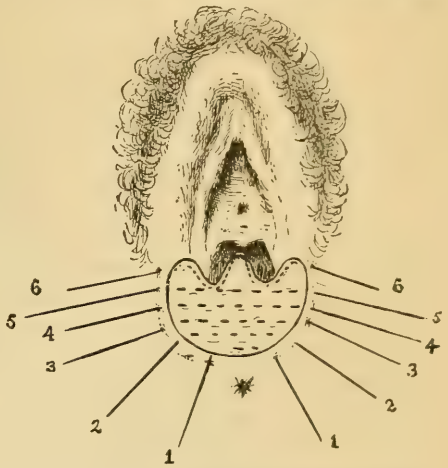


FIG. 269.—Course of Sutures in Secondary Perineorrhaphy (P. F. M.).

While the denudation is under progress, the index and middle finger of the left hand of the assistant who holds the left leg, and the right hand of the other assistant separate the labia by traction on the sound skin, and enable the operator to see the vaginal canal as he proceeds inward. This traction must be uniform, and is regulated by the operator at will during the whole operation, so as to secure the best possible symmetry of the two halves of the wound, and exactly corresponding points of entrance and exit of the sutures.

The raw surface is kept well sponged by the assistant holding the left leg, or by both assistants, the sponges being attached to holders as in the cervix operation. If any small islands of mucous membrane have accidentally been left in the raw surface, they should be trimmed off, and the edges of the wound smoothed as neatly as possible, before introducing the sutures. Particular care should be taken not to have the denudation on the labia extend too high up, or the vaginal orifice may be made too small; and to see that the points *a*, *a* correspond exactly in shape and size, or else they cannot be well coaptated by the sutures, and a gaping, raw fissure remains at the posterior commissure.

When the denudation has been completed, the wound is covered with a large sponge or wet cloth for a few moments to arrest oozing, the operator wipes his hands on a wet towel, and then proceeds to introduce the sutures, handed him by the assistant in charge of the instruments. The index and middle fingers of the left hand are passed into the rectum, the recto-vaginal septum is lifted up and put on the stretch, and under guidance of the fingers in the rectum, the sutures are introduced as shown in Fig. 269, about one-third of an inch from the edge of the wound. The

first and second sutures are generally passed straight through underneath the denuded surface without emerging, but with the remainder the space is too wide, and it will generally be found best to bring the needle out in the middle of the wound and to introduce it again at precisely the same spot, so as to have none of the suture exposed on the raw surface. Only

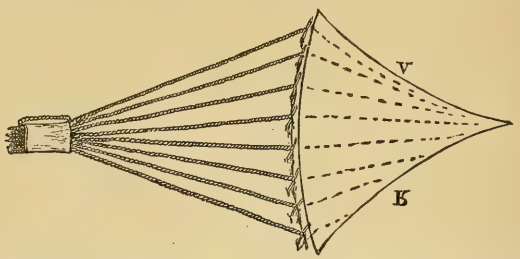


FIG. 270.—Section View of Course of Sutures in Secondary Perineorrhaphy, and Emmet's Method of securing the Ends.

the thread should be drawn out of this central aperture, for if the wire also is drawn through it is very liable to kink when the needle is reinserted at the same spot. To avoid drawing out the wire in the centre the assistant holding the left leg should seize and hold the wire back with his left hand, until the operator has reinserted the needle and brought it out again on the right side of the wound. In doing this, and to enable him to bring the needle out at a spot exactly corresponding to the point of entrance, the free thumb of the left hand may be used to push the right labium down on the point of the needle. With the longer sutures care should be taken not to force the needle too sharply around the left and right curves of the wound in passing it toward the centre and out on the right side; most needles are broken at these two points, particularly if finely tempered, as most of these straight needles are.

The needle having been withdrawn by seizing its point (not too sharply) with the needle-holder, and the operator and assistants watching the wire to see that its loop is properly fastened and that there is no kink to prevent its smooth passage through the long track made for it, the operator draws the suture through with the needle-holder, or for fear of its catching grasps it with both hands, and, with a rapid back and forth motion to free it from any obstruction, draws it through, and loosely twists the ends of the wire together. Although the rectum should be perfectly empty and clean, the left hand must be wiped on a wet towel before grasping the suture with it; if there happens to be fecal matter in the rectum care must be observed not to contaminate the wound or the needle and silk with the left hand, and hence I prefer to draw the sutures through with the right hand, only using both when there seems danger of the wire catching in its track. The

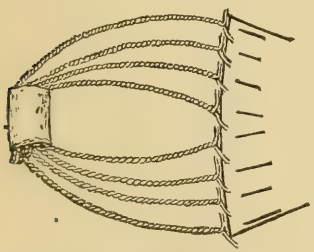


FIG. 271.—Hanks' Method of securing Ends of Sutures.

twisted ends of the sutures are grasped in the palm of the left hand and thus kept out of the way while introducing the remaining stitches. Special care must be taken not to allow the sutures to emerge in the wound in the lateral grooves, hence with the upper sutures the straight needle should be passed first directly upward in the direction of the pelvic cavity, and then, the groove being lifted up and effaced as much as possible by the fingers in the rectum, carried toward the centre ; the same precaution is to be observed on the right side. The last suture should pass *close* to the edge of the mucous membrane, and be brought out in the centre, *just within* the *un*denuded surface, so as to include this point in the suture and insure the exact coaptation of the raw edges at the new posterior commissure.

The interval between the sutures should be at most one-fourth of an inch; thus a laceration of the second degree would require five or six, one of the third degree six to ten sutures, in proportion to the length of the perineum. The higher up on the posterior wall the denudation goes, that is, the longer the projecting tongue seen in Fig. 268, the more sutures are required.

All the stitches having been introduced, the wound and vagina are thoroughly cleansed, the operator washes and disinfects his hands, and the twisted ends of the sutures are handed to an assistant to hold against the mons veneris. The operator disentangles suture No. 1 nearest the rectum, draws the lips of the wound together, bends the wires at right angles to the skin close to the wound, and, grasping an end in each hand, with a quick sweep crosses his arms several times and thus gives the wire a few twists, sufficient to hold the parts together temporarily. This is done with each successive suture, the wound, being carefully dried just before twisting, and the skin being brought in smooth apposition. When all the sutures are thus temporarily twisted, the wire-twister and shield are used to secure them permanently, each twisted suture being left about three inches long; and the ends of all together are then joined in a small piece of rubber tubing about one-fourth of an inch long, on the outside of which the free ends of wire are bent down and again secured by tightly winding a bit of wire around them and the tubing. (See Fig. 270.) Or the wires may be bent as shown in Fig. 271. The object of this tubing is to keep the wires together and prevent their scratching the patient's thighs, and to facilitate the removal of the stitches. If necessary, superficial sutures are now introduced, either of fine wire or silk.

The vagina is now wiped dry with a sponge on holder, the perineum cleaned, dusted with iodoform (if thought advisable, or if in a hospital), and the operation is completed.

After-treatment.—The patient's thighs just above the knee are loosely bandaged together, and she is allowed, indeed encouraged, to lie on her side as much as she chooses. The new perineum is not to be touched or handled by the nurse, except that a narrow strip of English lint, smeared with vaseline, may be laid along the sutures on each side if there is much soreness. The vagina may be syringed with a mild carbolized solution

once daily if there is any discharge, care being taken to insert the tube of the syringe so as not to touch the posterior commissure. If there is no discharge, and there should not be if the wound has everywhere been thoroughly united by the sutures, these douches may be omitted. The perineum may be washed by irrigating its surface several times a day. During these manipulations the knees may be slightly separated. After each irrigation iodoform may be dusted over the perineum if the operator has faith in this antiseptic. In private practice I never use it, and my results have been excellent.

Usually the urine has to be drawn, which should be done about every six hours, the urethra being exposed by very gently separating the nymphæ, and the vestibule cleansed before inserting the catheter, in order not to carry blood or purulent matter into the bladder. If the patient can urinate herself, I generally permit it, as no harm can happen to the wound, if it is well closed, by simply allowing urine to flow over the skin of the perineum. Indeed, some of my best results have been obtained in cases where no catheter was used. This, however, depends on the patient's ability to urinate herself. Very many women find it impossible to do so when lying on the back.

The bowels, having been thoroughly evacuated, can be left dormant for three or four days, unless they manifest a desire to move sooner, when an enema of soapsuds and warm water, with some sweet oil, should be given to ensure a soft (not fluid) movement. If there has been no desire up to the fourth day, a mild laxative should be given at night, and at the first sign of impending action the above enema. It should be remembered that it is imperative that the passage should be perfectly soft and smooth, absolutely without hard concretions, and unattended by pain; further, that next in danger for the new perineum to a hard passage with straining, is a diarrhea with straining. The latter action—straining—is to be absolutely avoided. In case of need, oxgall capsules, gr. v. each, may be given every three hours for twenty-four hours, followed by an enema of equal parts of fresh oxgall and soapsuds, or infusion of inspissated oxgall (℥ j. to 1 pint warm water), to soften concretions ; and if such, or a thick putty-like accumulation is found in the rectum, the nurse, or preferably the operator, must break the mass up and remove it with the fingers. Unless the nurse is in the highest degree reliable, the operator will always do well to attend to the first movement of the bowels himself, as it is then that the danger of relaceration or non-union presents itself, even though the stitches are still *in situ*.

Formerly the general practice was to constipate the bowels until after the stitches had been removed, and then to try to soften and remove the accumulation of a week or longer. In this endeavor, the newly healed perineum often suffered ; and at present the majority of operators prefer to allow the thoroughly emptied bowels to rest for a few days after the operation, but then to have them emptied gently every day or every other day until the stitches are removed. It is particularly after operations for complete laceration that this question of evacuating the bowels comes into

prominence, and it will be referred to again in that section. The diet for the first few days should be nutritious, but fluid ; after the bowels have been regulated, everything except articles likely to cause flatulence may be allowed. Stimulants are not necessary, although there is no special objection to them. Milk should be avoided until after the bowels have been moved, as it produces caseous excreta.

Removal of Sutures.—The bowels having been thoroughly moved the day before, on the tenth day (if there is suppuration or cutting of the sutures, a day or two sooner) the stitches are removed. The patient is placed in the same position as during the operation, but the legs are kept nearly in apposition and are held over the head of the operator, with knees and thighs flexed at a right angle. Cutting all the wires with one stroke of the scissors, they are liberated from the rubber tubing. The lowest wire is then seized with the dressing-forceps and gently drawn upon until the shining silver of its loop becomes visible close to the shaft ; this is clipped and the suture gently withdrawn *over* the line of union, that is, *toward* the side on which the wire was cut. While doing this the left hand approximates the nates to prevent tension on the wound. Thus suture after suture is removed, unless for fear of tension it appears safer to remove the sutures alternately. But, as a rule, if the sutures have been left in ten days, either the perineum is firmly united or the operation is a failure. Of course, care should be taken not to cut off the shaft of the suture at its very base, which may easily happen when a suture is deeply embedded ; if this accident should occur it will be almost useless at that time to seek to find the hidden suture, although of course the attempt should be made. Too much exploring may do more harm than leaving the suture in a week or two longer, until perfectly solid union has resulted. If preferred, the sutures may be removed with the patient lying on her side, when the perineum is sometimes more accessible. After removing all the stitches, the legs are again bound together and the same regimen is continued as before for three or four days, until the suture-canals are closed. The bowels are not moved for thirty-six hours after removing the sutures. After the fourteenth day from the operation, if everything has gone well, the patient may be allowed to sit up, soon she may walk about, and in three weeks from the operation she ought to be in fit condition to be discharged. For a couple of months she will do well to keep the perineum well greased with vaseline to prevent possible cracking of the fresh cicatrix ; the bowels should be kept well regulated, and coition should not be indulged in before two months at the earliest, the perineum and vagina being vaselined beforehand. A couple of years should be allowed to elapse before the new perineum is put to the test of parturition.

Operation for Complete Laceration.—As easy as is the performance of partial perineorrhaphy and as favorable as are usually its results, so difficult and complicated is generally the operation for complete laceration, and so frequently is it liable to be followed by failure. As already described, the rent extends through the sphincter ani, which retracts sharply to either side, and more or less up the recto-vaginal septum. We have therefore

not only to vivify and close the rent in the perineum proper (as in the partial operation), but also that in the septum, and to attach together the separated fibres of the sphincter ani, both of which objects are subject to difficulties and causes of failure peculiar to the location and functions of the parts. Thus during the first evacuation of the bowels both the septum and the sphincter may be torn open; or the retraction of the fibres of the sphincter may be such as to render all efforts to approximate or retain them in apposition by sutures futile. And if the sphincter is not restored to its integrity and its functions are not regained, the great object of the operation, the restoration of fecal and gaseous continence, is missed, even though the rent in the septum may have healed.

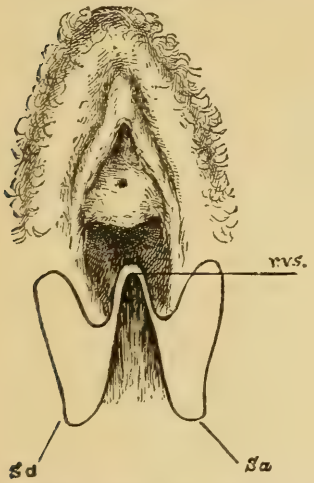


FIG. 272.—Area of Denudation in Complete Laceration of Perineum. *S d*, *S a*, separated ends of torn sphincter ani; *r.v.s*, fissure in recto-vaginal septum (P. F. M.).

FIG. 273.—Shape of Denudation for Complete Perineorrhaphy (Hegar & Kaltenbach).

The steps of the complete operation are these: 1. Denudation of the perineal laceration (as in partial rupture); 2. Extension of the perineal denudation to either side of the anus so as to include the cicatrix covering the separated ends of the torn sphincter ani muscles; 3. Still further extension of the denudation (if required) along the rent in the recto-vaginal septum; and 4. Apposition of all these denuded surfaces (perineum, sphincter ani fibres, and torn recto-vaginal septum) by sutures.

The preparation of the patient is conducted on precisely similar principles as for the partial operation. But, if there should be a catarrhal condition of the rectum or diarrhea, it would be well to subdue the former by applications of a solution of nitrate of silver, ten to thirty grains to the ounce, and iodoform and tannin suppositories; and the latter by bismuth and opium, castor-oil followed by Squibb's fluid extract of ipecac and opium in frequently repeated drop doses, etc., before operating. The rules for preliminary evacuation of the bowels, already given, should be followed with special thoroughness.

Details of Operation.—The method usually employed in this country is that described by Emmet, and consists in drawing the ends of the torn sphincter ani together by sutures which begin outside of the separated ends and pass around the rent in the septum close to the vivified edge. On being twisted the ends of the sphincter and the edges of the septal rent are approximated. The diagrams (Figs. 274, 275, 276), taken from Emmet, illustrate the principle on which these sutures act. The remaining sutures are then inserted precisely as for partial laceration.

The patient occupying the same position as for ordinary perineorrhaphy, the operator proceeds in the same manner to denude the left side of the vulva down to the anus, but then, instead of carrying the vivification

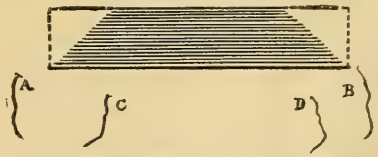


FIG. 274.—First Step. *C*, *D*, first suture; *A*, *B*, second suture.

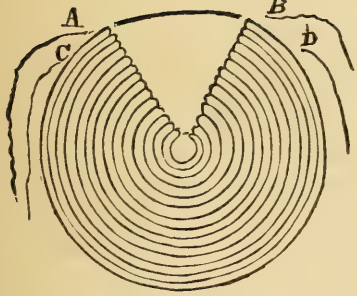


FIG. 275.—Second Step.

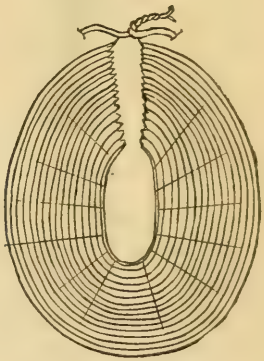


FIG. 276.—Third Step.

Diagrammatic Sketches representing Introduction of Sutures and Approximation of Ends of Torn Sphincter, according to Emmet.

immediately across to the right side, he trims off the cicatricial tissue to the left of the gaping anus in accordance with the extent of the cicatrix (see Fig. 272), and then carefully pares the edge of the rent in the recto-vaginal septum up to its angle, vivifying not only the edge of the vaginal mucous membrane, but also that of the rectum and the cicatricial border between them.

Some operators object to freshening the rectal mucosa, on account of the rather free oozing, but I think the broader the raw surface the better the chance of adhesion by first intention. The denudation is then carried down the right side of the triangle representing the septal fissure, the cicatricial tissue covering the right end of the sphincter muscle is trimmed off, and the vivification carried up on the right labium to correspond to the left side. Every particle of skin or mucous membrane which might

interfere with ready union should be carefully trimmed away from about the anus, so that when the two points *S a* and *S a* (Fig. 272) are brought together there shall be absolute symmetry and apposition. The next strip of tissue trimmed off carries the vivification from the border of the septal rent into the vagina, and strip after strip is removed precisely as in the partial operation, until the limit traced on the posterior vaginal wall is reached. Fig. 272 represents the usual appearance of the wound in an operation of this kind. In trimming about the anus, care should be taken not to wound hemorrhoids, which are not uncommon in these cases.

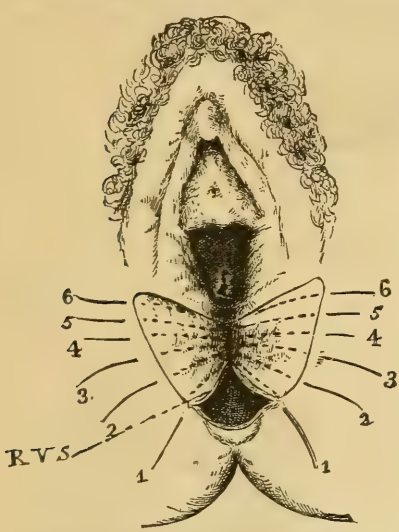


FIG. 277.—Method of Introducing Sutures in Complete Laceration (after Hanks). *R V S*, recto-vaginal septum.

The first suture is passed as shown in Fig. 277. If it is not inserted and brought out well *behind* the outer border of the anus, it will miss the end of the sphincter, and, while the perineum will be perfect, the operation will be a failure because there will be a gap or fissure in the median line (see Fig. 276) where the torn ends of the sphincter were not brought together, and hence failed to unite: continence has not been achieved. This first suture is carried just under the surface to the upper angle of the rent, there the needle (a short one) is brought out and immediately reinserted at the same spot and carried down the other side, and brought out at a point corresponding to its entrance. Suture No. 2 lies close outside of the first, and then the remaining sutures are passed in the usual manner.

If it is thought desirable, on account of obtaining a more correct idea of the extent of the wound and the number of sutures still required, the rectal rent may be closed at once by twisting the first two sutures, but generally I twist them all at the end. It is rare to require more than two of these semicircular sutures to close any rectal rent which should be treated by this form of suture. If the first suture has been well applied, on twisting it its junction will be carried within the sphincter. Figs. 277 and 278, modified from cuts by H. T. Hanks (*Medical Record*, July 1, 1882), give a very good representation of the course of the sutures and the approximation of the rent in the septum as the first sutures are twisted.

The *after-treatment* resembles that already described, except that flatus may require the repeated insertion into the rectum of a slender tube (like the child's nozzle of a Davidson syringe), a procedure requiring great delicacy of touch in order not to disturb the sutures; and that special pains must be taken to have the bowels loose and smooth. On the success of the latter function usually depends the entire success of the operation. The sutures are removed as already described.

For weeks afterward the utmost care should be observed to secure regular soft fecal evacuations, until the new sphincter has had time to regain its full power.

Simon's Operation for Complete Laceration.—The operation of Emmet is chiefly applicable to cases where the laceration does not extend higher than an inch up the recto-vaginal septum. It is obvious that a form of suture which, when permanently twisted, necessarily puckers together the edges of the rent (like the cord around the mouth of a bag), will not secure so smooth apposition when the rent is two inches long as when it is less than one inch long. It is true that I have in several instances succeeded admirably with Emmet's suture, although the rent extended nearly two inches up the septum; but several times the sphincter failed entirely to unite, and subsequent cauterization was required to close the defect; and in two instances a recto-vaginal fistula remained, although the perineum itself was perfect.

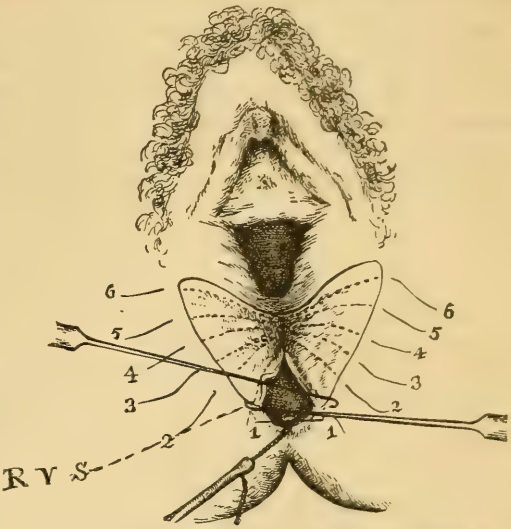


FIG. 278.—Method of Twisting Sutures in Complete Laceration (after Hanks). *R V S*, recto-vaginal septum.

For deep lacerations of the septum extending over an inch above the sphincter, particularly with prolapse of the rectal mucous membrane, a different operation is advisable, which consists in sewing together the edges of the rectal fissure separately, including the ends of the torn sphincter, tying the sutures in the rectum, and then doing ordinary perineorrhaphy. These two operations, proctorrhaphy or the rectal suture, and perineorrhaphy or the perineal suture, may be done successively at the same sitting, or when the rectal fissure is healed the perineum may be sewed. In the latter case the sutures may as well be tied in the vagina, as the gaping perineum will permit of their easy removal through that passage. But I have followed the lead of Simon, to whom the credit is due of having first elaborated and popularized this operation, and have performed both steps at the same sitting. The special point about the rectal sutures is so to insert them that they grasp only, but all, the denuded *rectal* mucous membrane, and do not include the vaginal mucosa. They are passed from the rectum on one side through the border of the denuded *rectal* mucous membrane, brought out *just beneath the border* of the denuded *vaginal* mucous membrane, carried over to the other side of the rent, and returned to the rectum in precisely the same manner. Each suture is tied and cut short in the rectum as soon as passed. When thus tied in the rectum

these sutures will accurately approximate only denuded surfaces; but if they had been carried out into the vagina and back again in the same manner, the undenuded edge of the vaginal mucous membrane would have been rolled into the rent and would have interfered with union. When these rectal sutures have been tied the edges of the vaginal mucous membrane are united by a row of fine superficial sutures, each of which is tied immediately after insertion, and perfect apposition will thus be obtained. A reference to Fig. 280 will explain the position and relations of these rectal and vaginal sutures. When the rent in the septum has thus been united, the perineal laceration has become almost effaced, and merely superficial sutures are required to bring together the skin and superficial fascia. The rectal and vaginal sutures may be either of fine twisted or braided disinfected silk, the rectal sutures being both cut short, or one

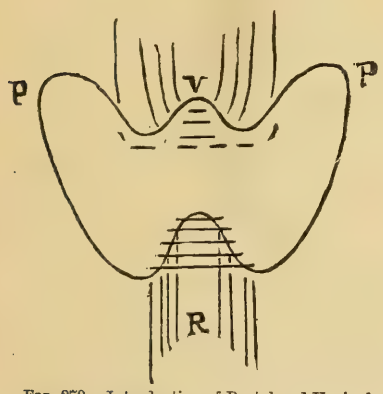


FIG. 279.—Introduction of Rectal and Vaginal Sutures in Simon's Colpo-perineorrhaphy.

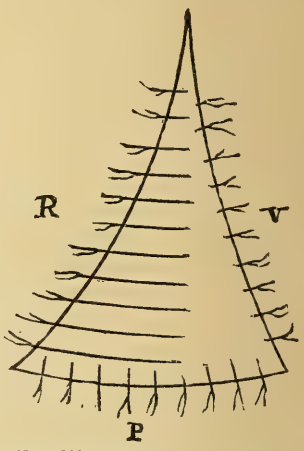


FIG. 280.—Section View of Sutures in Simon's Operation. *V*, vagina; *R*, rectum; *P*, perineum.

end only is carried out of the rectum, and all are tied in a knot; or of fine catgut, which are tied and cut short as soon as each suture is passed, and which are absorbed. For security of apposition until firm union is obtained I prefer silk; for convenience as far as removal is concerned, catgut has the advantage. In the vagina silver wire may be employed, each suture being cut short, but removed in several weeks; but wire must evidently be inconvenient for the rectal suture, because it pricks and requires removal.

In inserting the rectal sutures the silk or gut may be armed with a fine curved surgical needle at each end, and is then passed from vagina to rectum; or, what is quite as easy, only one needle is used and is passed around the circle from rectum to vagina, and back again through the other lip into the rectum. The utmost care in paring and apposition must, of course, be observed. The vaginal sutures are passed with a similar thin curved surgical needle and cut short. Both series, rectal and vaginal, may be allowed to cut their way out, if silk; but it is just as well to remove

the rectal sutures with fine scissors on the tenth to fifteenth day, if they are perfectly loose. Recent operators cut the silk sutures short in the rectum also, and let them cut out at will, and I think this is the best plan. The perineal sutures can be either wire or silk ; I think silk will probably do as well, as they are quite superficial when the recto-vaginal rent has been united. The perineal sutures, of course, are removed like silk sutures elsewhere.

In one instance of very deep rectal rent, after uniting the rectal mucosa by catgut sutures tied in the rectum, I brought the raw surfaces on the posterior vaginal wall together by very fine catgut sutures, which I cut short and dropped in the wound, and then closed the vaginal mucous membrane and the perineum over them. In this way I obtained a much wider line of union over the rent in the rectal wall, and guarded against accidental gaping in the rectal mucosa. The result was perfect union.

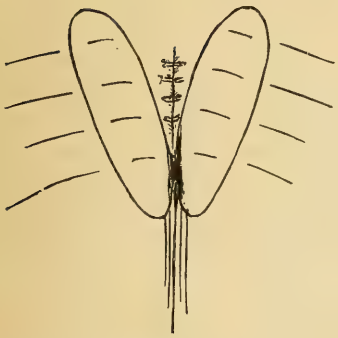


FIG. 281.—Introduction of Perineal Sutures after Closure of Septal Rent (P. F. M.).

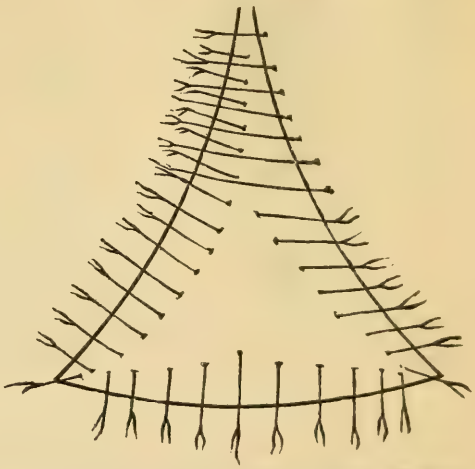


FIG. 282.—Section View of Sutures in Rent to Vaginal Vault. *V*, vagina ; *R*, rectum ; *P*, perineum (Kaltenbach).

Emmet's New Operation for Lacerated Perineum.—A very ingenious and anatomically correct operation for lacerated perineum has recently been devised by Dr. T. A. Emmet, who described it at the meeting of the American Gynecological Society in 1883. Since then it has attracted the attention of numerous physicians who have seen its author perform it at the Woman's Hospital, and it will doubtless remain one of the established operations in gynecology.

Starting from the opinion that, to restore the perineum to its normal condition and strength, it is necessary to reunite the fibres of the pelvic fascia which were torn when the accident occurred, Dr. Emmet denudes two elliptical surfaces in either lateral furrow of the vagina, beginning at the posterior commissure in the median line or posterior columna rugarum, and extending up variably from two to three inches. The limits of these two lateral denudations are the internal border of the posterior commissure, the lowest caruncle of the hymen, at either side, and the crest of the

columna rugarum posterior, or rectocele, in the centre. The edges of each lateral wound are then united by sutures, which are carried deep into the furrow and entirely under the raw surface, so as to pick up the separated fibres of the pelvic fascia. When first one side and then the other is sutured, there remains only a very shallow slit of mucous membrane in the median line to stitch together, which is done by silk. To remove the stitches it is only necessary to elevate the anterior vaginal wall with Sims' speculum.

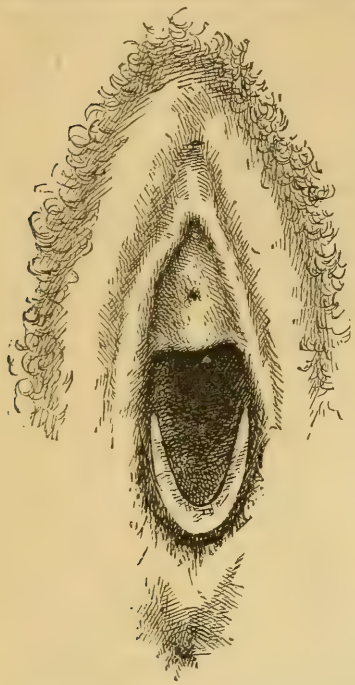


FIG. 283.—Shape and Site of Denudation in Emmet's New Operation for Lacerated Perineum (P. F. M.).

One great advantage of this operation is that the denudation is carried on entirely within the vagina, that the sutures are, all but the last few superficial ones, internal, and that the pain always attending the old operation of perineorrhaphy, which is in part a cutaneous operation, is avoided.

By taking in the redundancy, or "slack," of the posterior vaginal wall the new operation effectually narrows the vagina without destroying the normal median fold, as does Simon's operation for posterior colporrhaphy. In this respect this new departure of Emmet is undoubtedly preferable. In fact, it is a most excellent *operation for rectocele*, and it is extremely probable that it also fulfils the purpose for which it was devised, namely, of reuniting the torn pelvic fascia and thereby restoring

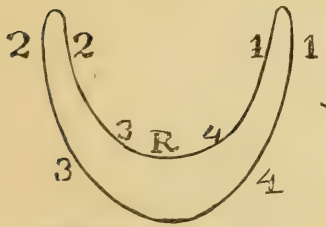


FIG. 284.—Shape of Denudation in Emmet's New Operation for Lacerated Perineum, showing Edges to be united by Sutures 1 to 1, 2 to 2, 3 to 3, 4 to 4. R, tip of undenuded strip on posterior vaginal wall, to be united to opposing point of perineum (P. F. M.).

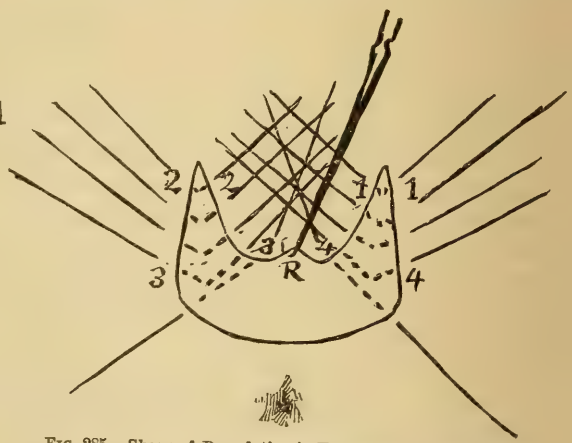


FIG. 285.—Shape of Denudation in Emmet's New Operation for Lacerated Perineum as seen when Tip of Rectocele, R, is lifted up by a Tenaculum during Paring and Introduction of Sutures (P. F. M.).

the strength of the perineum. But in so far it seems to me to fail, as an operation for laceration of the perineum, in that it does not restore the vulva to its pre-parturient condition; the vulvar cleft and vaginal orifice continue to gape, the fourchette is still wanting, and if the laceration was a deep one the posterior vaginal wall slopes down in proportion toward the sphincter ani. Of course, the rectocele is entirely and effectually removed, but, so far as I can see, in deep lacerations more is needed, and hence I do not think that the new operation can supersede the old, except in comparatively slight external lacerations, where the redundancy and prolapse of the posterior vaginal wall predominates and is the chief defect to be remedied. Whenever the perineal rent itself is deep, it seems to me that the old and well-established denudation of the labia with cutaneous sutures will still be needed, either alone, or if there be a rectocele, in addition to the new intravaginal method. A recent experience with this new operation confirms this opinion, since a second operation for the restoration of the normal vaginal outlet appears indicated in the case referred to. The similarity of Emmet's new operation to that of Freund, shown in Fig. 292, will be apparent at a glance. This operation I performed for large rectocele several times two or three years ago; its essential difference is that the skin of the labia and perineum is included in the denudation and the sutures.

It should be added, that the new operation is not adapted to complete lacerations through the sphincter ani.

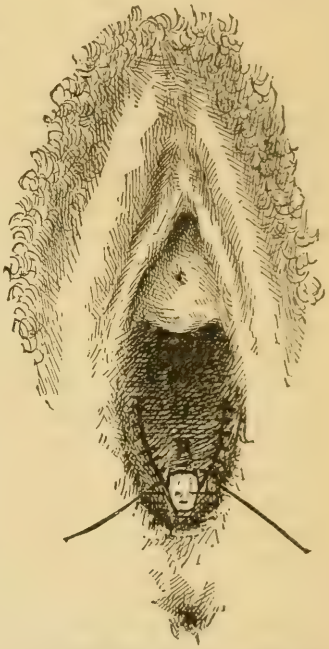


FIG. 286.—Emmet's New Operation for Lacerated Perineum. Lateral sutures twisted, leaving only small slit at posterior commissure unclosed. One circular suture through edge of labia and tip of rectocele, R, and several superficial transverse sutures are waiting to be twisted (F. F. M.).

Operation for Central Laceration.—When this rare accident is met with in its chronic condition, it is recognized by a small fistulous passage between vagina and perineum—a perineo-vaginal fistula. There is no use trying to cure such a fistula by caustics or by paring and uniting its walls. The only effectual treatment is to slit it open from the posterior commissure downward, trim out the cicatricial tissue in the track of the fistula, and unite it by sutures precisely like a partial laceration.

Tertiary Operation for Lacerated Perineum.—If the secondary operations above described fail to achieve complete or even partial union of the lacerated parts, the necessity for a still further operation arises. Failures after complete perineorrhaphy are not uncommon, and many an operator has seen himself compelled to repeat the attempt three or four times before success finally crowned his efforts. The tertiary operation should be deferred until perfect cicatrization of the recent wound has taken place, and

in the meanwhile the patient's general health should be built up, and the local tissues put in as good condition as possible for plastic union. In performing the next operation, the operator should, of course, endeavor to eliminate and avoid any sources of failure which he may be able to discover as having existed in the previous operation. Among such may be, neglect to have the bowels properly prepared beforehand and attended to afterward, insufficient denudation and imperfect coaptation; too thick or too thin needles or sutures, too tight twisting of sutures; want of cleanliness of instruments and sponges; general anemia, etc. In the large majority of cases the failure is due to some well-defined and avoidable neglect or error before, during, or after the operation. Occasionally, however, influences beyond the immediate control of the operator, such as hospitalism, abscesses and suppuration along the sutures, accidents, etc., may be at fault. If a large recto-vaginal fistula remains, the best plan is generally to cut through the newly formed perineum, and do the whole operation over again. The older operators fancied that unless the sphincter ani were paralyzed after perineorrhaphy, its contractions would hinder union; hence they were in the habit of dividing it posteriorly with the knife. This practice is now entirely obsolete, at least so far as the indications of paralysis of the sphincter is concerned. Hegar favors bilateral division of the sphincter after bad cases of operation for complete laceration, in order to permit the troublesome gases to escape freely during the first few days after the operation. If there were no fear of permanent injury to the sphincter this purpose would certainly justify the measure.

Another quite obsolete measure was to make long and deep incisions on each side of the perineum to relieve tension. When I have thought it necessary to relax the perineum as much as possible, which was the case only in tertiary operations, I have secured all the relaxation required by drawing the nates together with broad strips of adhesive plaster, with a hole cut in the centre for the rectal flatus-tube, through which the fluid fecal evacuations were allowed to pass.

The coaptation of the lips of the wound by quills or bead-tubes, through which the sutures were passed before being tied, has been abandoned as unnecessary and useless.

Dangers and Evil Results of Secondary Perineorrhaphy.—I have often been asked the question, by patients and their friends, whether this is a dangerous operation, and have always replied most decidedly, No. On the other hand, on being asked whether it was entirely free from danger, I have felt compelled to give the same negative answer. In itself, perineorrhaphy involves no danger to life, but, like any fresh wound, it may be exposed to certain accidents, such as hemorrhage, inflammation, suppuration, and septic infection, which may more or less endanger the health or life of the individual. While serious accidents are rare, I doubt not that one or more cases of septicemia, even with fatal termination, might be found recorded in literature, and I myself witnessed a simple operation for complete laceration, by Dr. B. F. Dawson, of New York, in which not a shadow of

blame could be attached to the operator for want of care or dexterity, but after which fatal tetanus developed.

Hemorrhage, at the time of the operation, is seldom serious; one or two arterial twigs may be cut or a vein may be punctured, but the bleeding is immediately arrested by forceps, and, if it still persists, permanently, by twisting the sutures. Ligatures are seldom required, and only once or twice have I thought it wise to tie the vessel with catgut, which was cut short and dropped. Secondary hemorrhage rarely occurs, because there are no vessels of importance injured during the operation, and it can easily be checked by cold or pressure.

Inflammation along the track of the sutures, and edema of the lips of the wound is not very uncommon. It may be due to bruising by artery-forceps during the operation, to too many or too tight sutures, to inclusion of blood in a pocket in the wound (as when the sutures are not kept well under the raw surface), and to the irritation of the sutures. I have thus seen cellulitis terminating in abscess in the ischio-rectal fossa, inflammatory edema and suppuration in the lips of the wound, the pus bursting either outward through the skin, or inward through the mucous membrane of the vagina or rectum.

Septic infection from enclosed pus in any part of the wound may take place. I have never seen it; but instances have come to my knowledge where, under peculiarly unfavorable atmospheric influences, rigors followed by a rise of temperature indicated septicemia, and called for the removal of the sutures and the leaving open and thorough disinfection of the wound. Inflammatory reaction and septic infection are more likely to occur in hospitals than in private practice. Hence it has been my custom to keep the perineum and vaginal orifice thoroughly dusted with finely powdered iodoform after every perineorrhaphy in the hospital, until the stitches have been removed and union found perfect.

Extreme care in cleansing the wound of coagula and in coaptating its surfaces, so as to avoid the formation of pockets or furrows, as well as observance of thorough antisepsis in everything pertaining to the operation, are the means to prevent septic infection.

If the inflammatory edema of the wound is but moderate, no interference but iodoform dusting, and perhaps vaseline strips, is required. Excessive edema, involving bursting of sutures, may require their entire or partial removal; or the wire loops may be simply cut, so as to relieve tension, but the suture left as a sort of a splint for several days longer. Edema of the tissues about the anus soon after the operation is often a source of great annoyance to the patient, even in partial ruptures, and relief may be given by an ice poultice during the first forty-eight hours, or, if the edema persists, by simply cutting the loop of the suture nearest the anus. After the bowels have been moved this edema usually disappears.

Of the *evil results* occasionally following the operation the most frequent and annoying is the formation of pus along the track of the wound or the stitches, and its evacuation either into the vagina or rectum, or between the stitches through the perineal wound. In the one case we have a recto-

vaginal fistula, and in the other a perineo-vaginal or perineo-rectal fistula. The worst accident, by all odds, is the perforation by the pus of the recto-vaginal septum; the perineum may be perfect, but the operation is a failure, since air and fecal matter pass into the vagina through the fistula. If the opening is small it very often closes spontaneously in the course of a few weeks, or it is healed by lunar caustic, and a cure is established. Hence it is well for the operator not to express himself at once too positively when he suspects a failure of his operation, for two or three weeks may produce so satisfactory a result, as to continence, that the patient herself may never be aware how near she was to failure. But if the fistula is large, that is, of sufficient size to admit a lead-pencil, it is very unlikely to close by itself, and the best measure undoubtedly is in due time to split the whole perineum open again, however cruel to the patient and annoying to the operator this may seem, and do the operation over again. It is generally a waste of time and trouble to try to close a recto-vaginal fistula by paring its edges and bringing them together by sutures. Even though the mucous membrane of the vagina is made to unite, a pocket is left in the septum into which feces pass from the rectum, and sooner or later the fistula reopens. Simon had some success in closing these fistulæ from the rectum, which was everted by the fingers of an assistant in the vagina, but complete union is exceptional.

A *perineo-vaginal fistula* is not nearly so bad, and usually closes spontaneously or on cauterization. Even if left open it produces no special annoyance, and I should hardly think of splitting the septum between the perineal opening and the posterior commissure, and repeating that portion of the perineorrhaphy, unless the band of tissue anterior to the perineal opening was very narrow. The efficiency of the new perineum as a whole would settle the question as to whether it required additional strengthening or not.

A recto-perineal fistula is a more serious matter than a vagino-perineal, because rectal discharges will escape through it, but if minute it occasions little annoyance. If troublesome, it should be slit through the sphincter and healed by caustics. To sew it together does but little good, as the space is too small to accommodate the number of stitches required. Such fistulæ should be treated like ordinary anal fistulæ in either sex.

A very annoying accident in deep complete lacerations is the failure of the sphincter muscle to unite. If the anus gapes at all, the rectal mucous membrane is liable to prolapse, and the condition is but little, if any, better than before the operation. It is of little use to try to restore that portion of the perineum, because so many sutures are required to bring the sphincter in apposition that they crowd each other and produce suppuration or cut out. I have been obliged in one case, after failing with this plan, to slit the whole perineum open again and begin anew.

Small fissures at the anterior margin of the anus can usually be healed by the stick of nitrate of silver and iodoform powder, and the sphincter restored to very fair power.

In three instances a cellulitis and abscess in the ischio-rectal fossa de-

veloped, which were poulticed, and twice I succeeded in causing the pus to point toward the skin just inside of the tuber ischii, where I evacuated it with the knife; in the third instance the abscess burst through the perineal wound, and the sinus speedily closed. The sutures were not removed until the cellulitis had all disappeared, and all three cases made good recoveries.

Not uncommonly the skin fails to unite at some point of the perineal wound, and a pocket remains after the sutures are removed, which usually closes spontaneously within a week. After removing the sutures the skin of the new perineum usually appears elevated in ridges and nodules between each two sutures, and the perineum has a rough, decidedly unnatural appearance. The operator can console himself and the patient by the assurance that a few weeks will efface all these irregularities, and that the skin will become almost as smooth as before the original rupture.

Besides the danger of giving rise to accumulation of blood and pus between the surfaces of the wound, the formation of pockets, by allowing the suture to protrude at some portion of the denudation, has another, although less serious, consequence, namely, the gradual development of small cysts containing sero-purulent fluid in the substance of the new perineum. This development may also be due to the accidental leaving of small islands of undenuded tissue in the wound, which continue to secrete the serous discharge peculiar to the vagina. These little cysts are usually found in the median line, and feel like movable grapes between the skin of the perineum and the vagina. I have had two such instances among my earlier cases. In the second instance the lady became pregnant, the cyst grew rapidly, and attained the size of an English walnut. Just before labor I incised it and cauterized its interior with tr. iodine, and fortunately it did not, as I had feared, interfere with the distention of the perineum. In the other case I incised the cyst and obliterated it by thoroughly burning it with solid nitrate of silver.

As a rule, in cases where everything is going on well, there is no rise of temperature after a perineorrhaphy; should such occur, and the patient complain of pain and throbbing in the wound, especially about the third to fifth day, it is well to inspect the perineum and gently touch its sides, for either inflammatory edema of the wound, or cellulitis in the flaps, or suppuration is taking or has taken place somewhere in the wound. If then the temperature drops, the pain subsides, and pus is found oozing from the vagina, rectum, or between the perineal sutures, the presence of an abscess is assured. Rise of temperature, then, and pain several days after subsidence of the soreness immediately following the operation, are symptoms to be watched and feared. From what I have said in the preceding pages, it will appear that while edema, cellulitis, and suppuration are annoying and disquieting circumstances, their occurrence by no means indicates that the operation is to be a total failure, since small perforations and pockets may all eventually heal spontaneously and an ultimate good result be obtained. Primary union, it is true, may not be perfect, but a practical success is often assured by the aid of granulation and cicatrization.

Failures.—The preceding pages already contain the causes and prevention of the failures of secondary perineorrhaphy. It seemed more convenient to discuss these points while speaking of the evil results liable to follow the operation, which constitute in the main the sources of total or partial failure. It has been seen that the majority of these causes may be attributed to the operator or the method of operation, some to the constitution and carelessness of the patient, and some to influences (atmospheric, telluric) not under the control of either operator or patient. One of my failures, in a case of large complete laceration, was due to the patient's having, unknown to me, swallowed a prune-stone several days before the operation; this, unfortunately, had not come away before, but during one of the first movements of her bowels, when union seemed perfect, wedged itself crosswise into the new anus, and tore out the wires holding together the ends of the sphincter. While the rest of the perineum was perfect, the anus gaped widely.

The proportion of failures after partial perineorrhaphy is small. Out of my first sixty-five cases, all of which were in private practice, although not always with the best hygienic surroundings or experienced nursing, I had not a single instance of failure. There were two cases of ischio-rectal abscess and several of slight gaping of the cutaneous wound, but in every instance the perineal body was solid, the posterior commissure perfect, and the object of the operation attained. Of these sixty-five cases fourteen were complete lacerations, and of these latter only twice did the sphincter ani fail to unite completely, and then a few cauterizations produced perfect control. In my last fifty operations, however, I have not been so fortunate, for I have had one partial (the prune-stone case) and four total failures in deep complete lacerations, all in the hospital; and one private case, where an ischio-rectal abscess burst into vagina and rectum, causing a fistula, which healed completely in a few weeks. Of the partial operations all succeeded. I have no explanation to offer for the four failures, except to repeat that they were all hospital cases, and to say that, in one instance, the general anemia of the patient was certainly to blame. The cases were all very bad rents, and in three of them I employed the separate recto-vaginal suture with as great care as I could observe. And still suppuration took place, and destroyed whatever union had already occurred.

Operation for Rectocele (Posterior Colporrhaphy).

In describing the pathological results of laceration of the perineum, I have already mentioned subinvolution and prolapse of the posterior vaginal wall, with or without the anterior wall of the rectum—so-called rectocele—as one of these, and as one of the indications for perineorrhaphy. I there stated how rectocele developed, what influence it has on the position of the uterus, and how it was more or less relieved by restoring the perineum and narrowing the vaginal orifice. By referring to the details of that operation and examining the diagrams, it will be seen that I have included a moderate degree of rectocele in the description of the operation when it has

to be performed for partial lacerations of the third degree. Indeed, rectocele may be said to be so frequent a companion of the deeper partial lacerations, that the denudation usually has to be extended some distance up the vagina to include the protruding posterior vaginal wall, in order to get a solid perineum. It is only in the minor degrees of laceration, and in exceptional cases with the major rents, that a rectocele does not exist; and even in the minor ruptures, the great source of annoyance and the indication for perineorrhaphy, is the redundant posterior vaginal wall. The operation of perineorrhaphy, therefore, in the majority of cases, is properly a colpo-perineorrhaphy, and that is the operation which I have chiefly described in the preceding section.

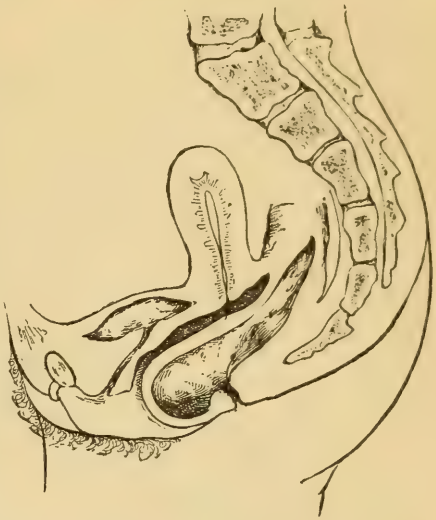


FIG. 287.—Section View of Large Rectocele (P. F. M.).

But there are cases, and not very uncommon ones, where the rectocele forms by far the most prominent feature of the case, and where the perineum is repaired merely to afford a base of support to the constricted posterior vaginal wall. These are the typical cases of rectocele for which I wish now to describe an operative cure.

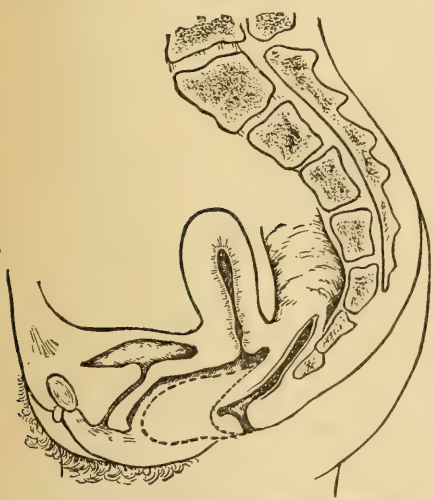


FIG. 288.—Section View of Large Rectocele, with Dotted Line showing Limit of Denudation and Constriction of Posterior Vaginal Wall (P. F. M.).

Such a rectocele is depicted in Fig. 287, and Figs. 288 and 289 show how much of the protrusion must be reduced by vivification and sutures before restoring the perineum. With these large rectoceles it does not suffice to merely extend the denudation upward a short distance from the perineal wound, as I have described under the name of colpo-perineorrhaphy, but we must first constrict the vagina so far as its posterior wall is redundant — that is, do colporrhaphy thoroughly, and then restore the perineum, both of which operations are distinct, although done at the same sitting.

Perhaps the most effectual method for constricting the vagina is that known as *posterior colporrhaphy*, introduced by the late Professor Simon, of

Heidelberg. The outline of the denudation on the posterior vaginal wall, and its extension to the labia and perineum, is shown in Fig. 289. The

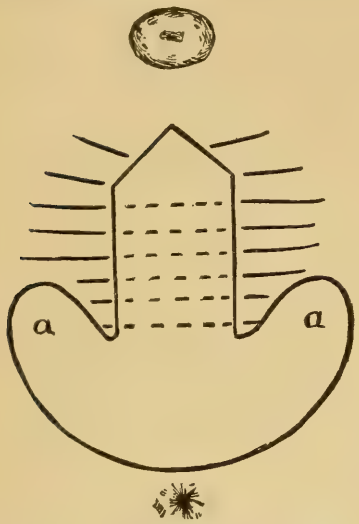


FIG. 289.—Outline of Denudation for Rectocele and Perineum, Shown in Section in Fig. 287 (Modified Simon's Posterior Colporrhaphy). *a a*, labial denudation (P. F. M.).

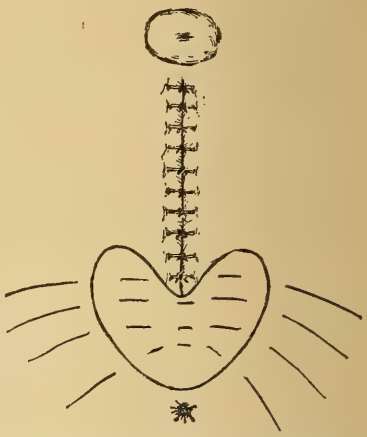


FIG. 290.—Denudation on Posterior Vaginal Wall in Fig. 289 Closed, leaving only Superficial Perineal Wound (P. F. M.).

patient is placed in the gluteo-dorsal position, and the gaping vagina is exposed by a fenestrated speculum shown in Fig. 293, which is held by an assistant. The object of this speculum is not so much to expose the

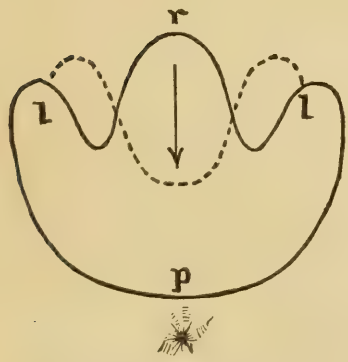


FIG. 291.—Usual Form of Butterfly Denudation for Colpo-perineorrhaphy. Dotted lines indicate that point *r* is drawn down, to resemble Fig. 292. *r*, rectocele; *l l*, labia; *p*, perineum (P. F. M.).

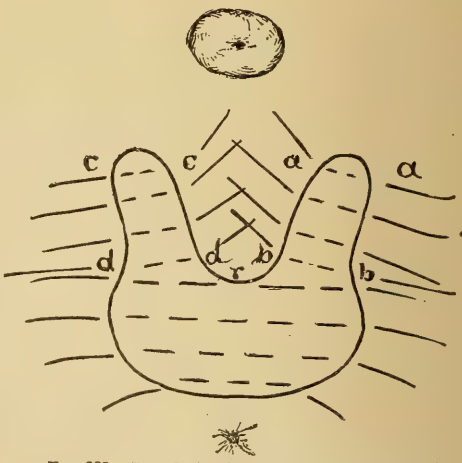


FIG. 292.—Denudation for Large Rectocele, according to Freund. *a a*, *b b*, *c c*, *d d*, points approximated by sutures; *r*, apex of rectocele to be united to raphé of perineum (P. F. M.).

posterior vaginal wall, which could easily be done by simply everting it from the rectum or drawing it down with tenacula, but chiefly to enable

the operator with a bistoury to trace out the outline of the space to be denuded and secure a symmetrical figure. If the denuded space is asymmetrical the line of union will not come in the middle, and will not therefore be in the position where the greatest support is needed.

When the two lateral borders of the denudation have been traced and joined above by a transverse line, the speculum is withdrawn, and the operator begins in the usual manner, with tissue-forceps and scissors, to denude the enclosed space on the posterior vaginal wall, starting at the left side of the vulva and proceeding strip by strip, precisely as in colpo-perineorrhaphy. (Simon used the knife, and denuded through the fenestrated speculum, but I prefer the scissors.) As the denudation advances upward, the operator draws the loose vaginal wall toward him with the forceps or tenaculum, or the field of denudation may be exposed by separating the lateral walls of the vagina by retractors, or lifting up the anterior wall with a Sims speculum. The length of the denudation from the vulva to its upper limit will vary between three and five inches, according to the size of the rectocele, and can be extended upward beyond the traced cross line if the

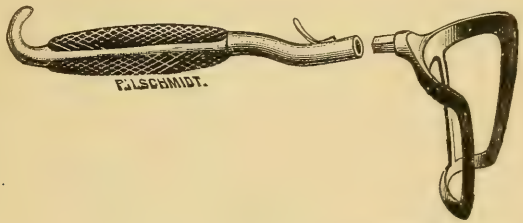


Fig. 293.—Simon's Fenestrated Speculum for Posterior Colporrhaphy.

operator thinks best. When a point not less than one inch below the cervix is reached, the operator marks a point in the median line about one-half inch above the cross line, and drawing a line on each side to meet the lateral border of the denudation, vivifies this triangle. The object of pointing off the denuded space is to secure smoother coaptation, and to avoid a pucker or pocket at the upper limit of the median suture.

Having now completed the posterior denudation, the operator may at once vivify the edges of the vulva and the perineum, connecting it with the vaginal wound, or what is rather better, he inserts the vaginal sutures, ties them, and then pares the perineum. He can then judge better how large a wound is required to build a solid cutaneo-muscular foundation for the constricted vaginal wall. The sutures for the vagina may be either wire, silk, or catgut. Simon always used silk, allowing them to cut out; I have employed both wire and catgut, and certainly prefer wire but for the trouble of removing the stitches even weeks after the operation. It is difficult to see and cut them high on the posterior wall, for they have to be removed in the dorsal position, the anterior wall being lifted with a Sims speculum. Of late I have used No. 2 catgut entirely, dropping the stitches, and have been well satisfied. The sutures are introduced from above downward, being knotted and cut short as soon as passed. An ordinary

surgical needle is used, and the sutures are passed underneath the raw surface as carefully as practicable. Here, as in every plastic operation involving large raw surfaces and loose, elastic tissues, the formation of pockets and grooves should be avoided. The sutures should be placed pretty close together so as to insure perfect coaptation of the mucous membrane. When the last suture has been tied and cut short, the perineum is pared and sutured in the usual way, wire being the best suture, but the stitches not being passed so deeply as in simple perineorrhaphy. It is well not to bring the vaginal suture down too near the perineum, but to leave sufficient raw surface at the posterior commissure for the upper perineal sutures, as in the ordinary operation. My success with this operation, which I have performed in numerous instances, has been so good that I have not felt disposed to discard it for another. In no case which I have had occasion to see again, has the posterior vaginal wall protruded. What the influence of parturition might be on the linear cicatrix, I cannot say, for none of my cases have presented themselves after that event. Of course I should fear a stretching of the cicatrix, to say the least, and then probably a return of the rectocele.

The median situation of the cicatrix, and the fact that in the normal condition the posterior vaginal wall does not show a furrow but decidedly a fold, the columna rugarum posterior, with two lateral furrows, induced Professor Freund, of Strassburg, to propose a different operation for posterior colporrhaphy, which is represented in Fig. 292. Emmet has recently described a (as I understand his paper before the American Gynecological Society, in 1883) similar operation. Freund denudes a space similar to that represented in Fig. 292 (I have modified Freund's sketch by omitting the rectal fissure and slightly rounding off the lateral borders), leaving a central tongue or flap of the posterior ruga of the vagina, and then unites the lateral borders of that flap to the mucous membrane of the lateral vaginal wall on each side, thus *a* and *a*, *b* and *b* on the left, and *c* and *c*, and *d* and *d* on the right side, are united by as many sutures as are required. When this has been done, the perineum is closed as usual.

I have done this operation once in the following way: In a large, exceedingly flabby rectocele, I denuded in the usual manner, extending the upper central limit of the denudation to a point fully four inches from the vulva (Fig. 291). Then seizing the centre of the undenuded mucous membrane at *r* with a tenaculum, I drew it down until it was on a level with the vulva, and had it held there by an assistant. This was easily feasible in the relaxed redundant state of the posterior vaginal wall, without in the least dislocating the uterus; indeed, the remainder of the posterior vaginal wall was thereby merely gently straightened. The denudation then assumed the shape of Fig. 292, and the lateral borders of the tongue of normal mucous membrane thus formed were united by catgut sutures to the corresponding borders of the vaginal and labial denudation on each side, precisely as shown in Fig. 292. The perineum was then closed as usual with silver sutures, and when the latter were removed on the fourteenth day, perfect union was found, which has proved permanent. I

have not yet formed an opinion as to which of these two methods is preferable, but think that my larger experience with median posterior colporrhaphy would lead me to expect greater support from it for the posterior vaginal wall and the uterus. The Freund-Emmet method certainly will not answer when the rectocele is accompanied by descensus uteri, for the dragging down of the rectocele to form the central flap or tongue would then still more dislocate the uterus and fix it in that position. Therefore I am inclined to believe that for rectocele and descensus uteri Simon's method is the best; and for simple rectocele, that is subinvolution and redundancy of the posterior vaginal wall, the Freund-Emmet method seems most applicable.

Operation for Cystocele (Anterior Colporrhaphy).

The definition and etiology of the condition somewhat incorrectly termed "cystocele" have already been given when discussing the pathological conditions following laceration of the perineum. As "rectocele" is not always a protrusion of the rectum, but frequently a redundancy or prolapsus of the posterior vaginal wall into which gradually the anterior wall of the rectum may be drawn — so "cystocele" is not properly a prolapse of the bladder, except in so far as the base of that viscus participates in the prolapse of the anterior wall of the vagina. These two conditions ought properly to be called posterior and anterior colpocele, with or without accompanying rectocele and cystocele, as the case may be. I make this explanation merely to guard myself against the criticism of giving an incorrect name to a certain condition and to insure the student against misunderstanding.

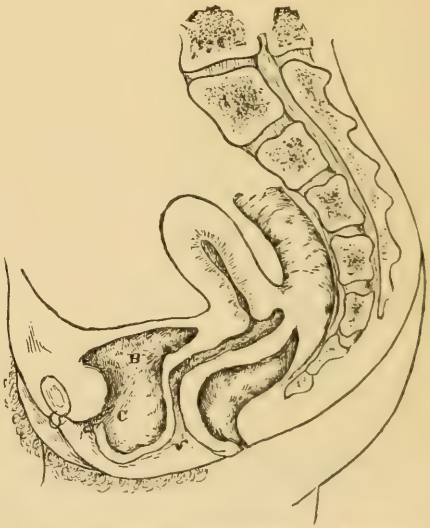


Fig. 294.—Section View of Cystocele. *B*, bladder; *V*, vagina; *C*, cystocele (P. F. M.).

A condition which is very readily mistaken for cystocele is a redundancy of the anterior vaginal wall and the bulb of the urethra; I have seen this mass so large as to project from the vulva and inconvenience the patient. Another condition liable to be mistaken for cystocele is a sacculation of the urethra alone.

Diagnosis.—In cystocele the point of a sound or catheter introduced into the urethra passes almost directly down to the bottom of the sac protruding between the labia and can be felt there; in simple redundancy or isolated prolapse of the anterior vaginal wall, the sound goes straight into the bladder, and not down into the sac; and in urethrocele the sound first

goes to the bottom of the sac, and then on being partly withdrawn passes inward to the bladder. All these conditions may exist together. The perineum in vaginal redundancy and urethrocele may be perfect.

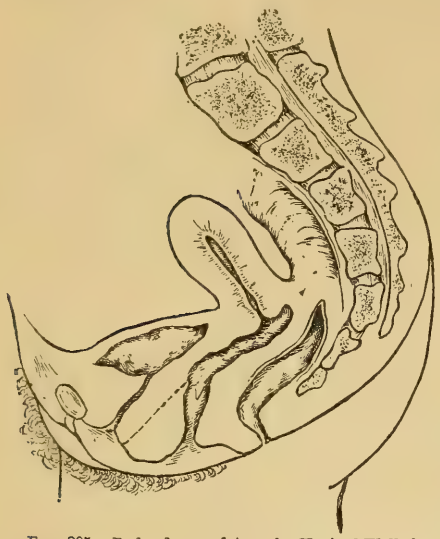


FIG. 295.—Redundancy of Anterior Vaginal Wall simulating Cystocele. Dotted line shows redundant portion (P. F. M.).

The indications for anterior colporrhaphy consist not only in the annoyance which the presence of an ovoid protrusion between the labia gives the patient, but in the distress which the sacculation and decomposition of residual urine in the dependent bladder-diverticle causes, and finally in the influence exerted on the position of the uterus.

Not every case of cystocele calls for an operation. Indeed, while rectocele is usually incurable otherwise than by surgical means, and offers the best possible chances for permanent cure thereby, a cystocele justifies an operation only when its symptoms cannot be relieved by mechanical supports, or the condition of the part offers fair inducements that the relief obtained will be permanent. Whenever a cystocele can be supported with comfort and with no more inconvenience than an occasional removal of the pessary, and perhaps its substitution for a week or two by astringent tampons until a possible erosion has been healed, then by all means be satisfied. In this way I have a number of patients wearing a Gebrung pessary with perfect comfort for several years, who never would have been permanently benefited by surgical means. Such cases are those of minor degrees of cystocele, where the tissues are still possessed of sufficient tone to justify the expectation of a cure if the prolapsed part is properly supported for a year or two, as in young women, whose vaginæ have not yet become overdistended throughout; further, old women, past the menopause, whose

FIG. 296.—Urethrocele. B, bladder; U, urethrocele. The line shows where the fistula should be made (P. F. M.).

tissues have become so relaxed and flabby from age and childbearing, whose vaginal walls have lost all contractility, that a cicatrix would be sure to stretch almost as soon as the patient leaves her bed. In such patients the operation is not justifiable, because it is either not necessary, or because it offers no prospect of a cure. But in cases where the cystocele is too large to be cured by a supporter, where the tissues still have fair tone, where the woman objects to wearing a support, and where there exists a rectocele with or without prolapsus uteri for which the operations already described are to be performed, there anterior colporrhaphy is indicated and will ordinarily give a good result.

Operation.—The object is so to narrow the anterior vaginal wall that it will give permanent support to the bladder and prevent the steady press-

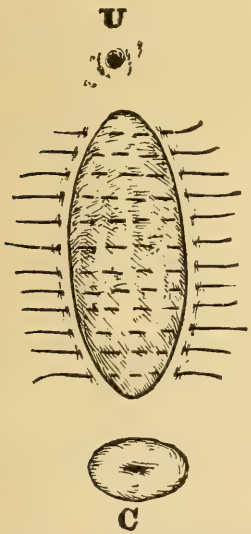


Fig. 297.—Oval Denudation for Cystocele. U, urethra; C, cervix (P. F. M.).

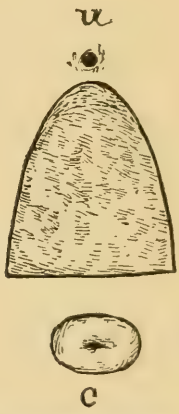


Fig. 298.—Horseshoe Denudation for Cystocele. U, urethra; C, cervix (P. F. M.).

ure of that organ from again forcing it down into the vagina. To secure this object various methods have been devised, most of which are open to the same objection, of failing to furnish a cicatrix which will not stretch in time and allow the old prolapse to return. The open horseshoe of Sims and closed horseshoe of Emmet, the oval denudation of Dieffenbach and numerous others, down to the present day, all are open to this same objection, and the ideal operation for cystocele has still to be invented. Another objection to these horseshoe and oval, in fact to all shapes of longitudinal denudations, is that the number of sutures required to close them is so large as to make their eventual removal, if silver, a somewhat arduous task—a point of considerable importance in the numerous cases where cystocele is contemporaneous with rectocele and laceration of the perineum, and where it is desirable to perform these operations, if possible, at the same sitting. Of course, catgut and silk might be used, but the

former is so soon absorbed as to be scarcely reliable for cystocele, and silk must either be allowed to cut out or remain for at least three weeks.

It may as well be laid down as a fundamental principle for anterior colporrhaphy, even more than for denudations on the posterior wall, that the larger the denuded surface the firmer the cicatrix and the more permanent the result; and that all methods which allow undenuded vaginal mucous membrane to be enclosed by linear cicatrices are to be condemned.

The denudation may be accomplished in two ways: 1, by clasping a longitudinal fold of vaginal mucous membrane in a clamp (a method which, by the way, has been employed in rectocele, but is now abandoned), passing the sutures underneath the clamp, slicing off the fold close above the clamp, and then tying the sutures; and 2, by tracing out the space to

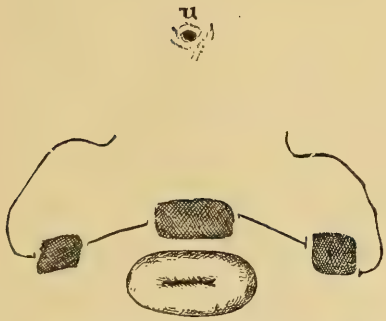


FIG. 299.—Emmet's Operation for Cystocele. First step. u, urethra (Emmet).

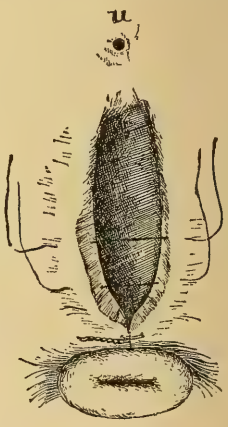


FIG. 300.—Emmet's Operation for Cystocele. Second step, after twisting sutures shown in Fig. 299. u, urethra; c, cervix (Emmet).

be denuded with tissue-forceps and scissors, and then paring off strip after strip with the scissors, as in perineorrhaphy; then introducing the sutures completely under the raw surface and tying or twisting them, and cutting the ends short. In either method the bladder should be lifted away by a thick sound in its cavity, and with any fair care it cannot well be injured.

The denudation should extend from slightly below the meatus to within a half to one inch of the cervix. A reference to the diagrams (Figs. 297 and 298) will illustrate the principles of the ovoid and horseshoe denudations. Figs. 299 and 300 show a recent method devised by Emmet. In Fig. 299 is represented the first step of the operation, the vivification of three oval surfaces just below and to either side of the cervix, which are brought together by a wire suture, which is twisted. In this manner two longitudinal folds are produced on the anterior wall reaching almost to the meatus. The edges of these folds are vivified from the cervix forward, and as each half-inch of denudation is accomplished, the sut-

ures are passed and twisted, thus avoiding loss of blood, until the end of the folds is reached. The objection to this method, in my opinion, is the small amount of denuded tissue, which objection might be obviated by paring all the intervening tissue between the two longitudinal folds before twisting the first suture.

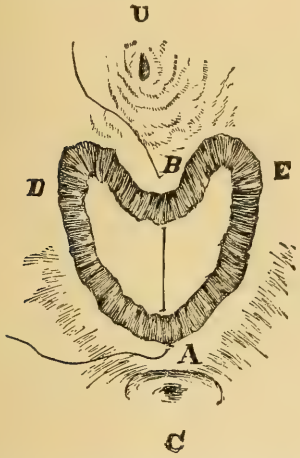


FIG. 301.—Emmet's Operation for Urethrocele and Cystocele. First step. A, B, D, E, points joined by sutures; U, urethra; C, cervix (Emmet).

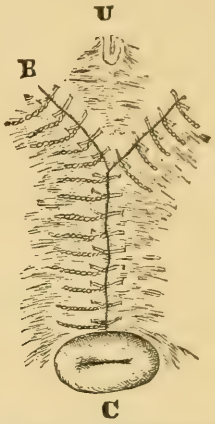


FIG. 302.—Emmet's Operation for Urethrocele and Cystocele. Second step. Sutures twisted. U, urethra; C, cervix (Emmet).

For cystocele with urethrocele, or with an excess of tissue about the bulb of the urethra, Emmet has devised an operation consisting of a peculiar hoof-like denudation, extending from cervix to bulb of urethra, and then spreading along each side of the urethra, and meeting by a concave

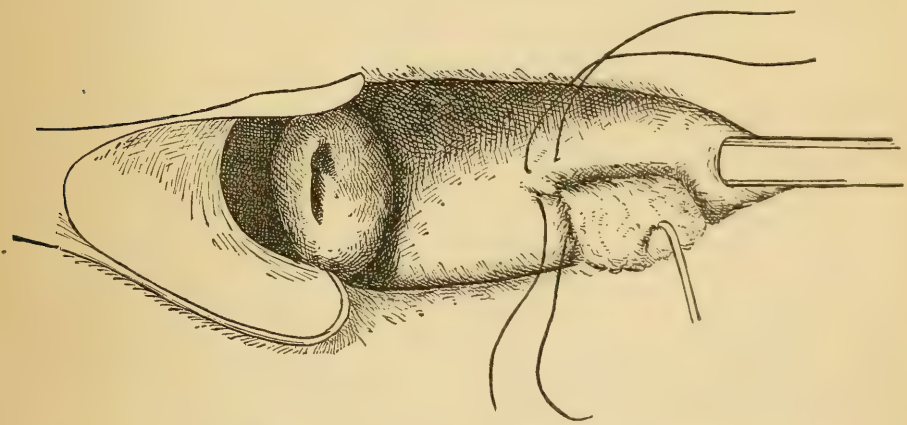


FIG. 303.—Emmet's Operation for Urethrocele, Side View (Emmet).

line in the centre (Fig. 301). Why the centre of this figure is not also denuded, I do not comprehend.

The longitudinal denudations have, in my hands, failed to secure per-

manent relief, for the very reason mentioned, the early stretching of the cicatrix. And in the very cases where I hoped for the most benefit from the cystocele operation—that is, when I wished to restore at the same sitting the natural support of the anterior vaginal wall, the perineum, the

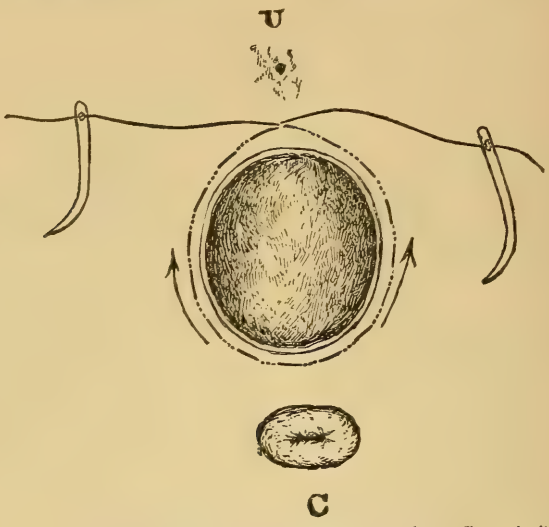


FIG. 304.—Stoltz's Operation for Cystocele. First step. U, urethra; C, cervix (P. F. M.).

length of time required to denude and introduce the numerous sutures, and the subsequent difficulty of removing them, dissuaded me from attempting these methods. Hence, when, a few years ago, a new method, devised by Stoltz, of Nancy, became known to me, which seemed to do away with these objections, I tried it, and have since had considerable experience with it. It is represented in Figs. 304 and 305, and may be called the tobacco-pouch operation. The patient is placed in the lithotomy position (for the other operations on the anterior vaginal wall she may be either on the back or in Sims' position, when the operation is done through Sims' speculum), the anterior vaginal wall is pressed out by a thick sound in the bladder, so as to render it prominent and tense, and the operator proceeds to trace out with tissue-forceps and flat-curved scissors (perineum scissors) a circular space, varying in size from a silver dollar to three inches in diameter, extending from about half an inch of the meatus to the same distance of the cervix. This space he rapidly denudes with the scissors, of course being careful to pare superficially so as not to injure the bladder. Two slightly curved, flat, sharp-pointed anatomical needles are then threaded with a double piece of No. 2 braided silk, one needle at each end, and, beginning just in front of the cervix, the suture is passed

FIG. 305.—Stoltz's Operation for Cystocele. Second step. U, urethra; C, cervix (P. F. M.).

on one side of the raw surface, in and out of the mucous membrane, about half an inch from the edge, until it reaches the median line between meatus and denudation; the same is done with the other end of the suture on the other side, and the ends are then crossed, and the denuded surface, being cleaned, is pressed inward toward the bladder with the point of a sound, and the suture is firmly tied, the sound being removed at the last moment. One end of the suture is cut short, and the other fastened to the thigh or inguinal skin by adhesive plaster. To allow this, the suture should be at least twelve inches long. A thick button is thus formed in the bladder, the raw surfaces of which adhere, and which gives no inconvenience whatever. This operation can easily be done in twenty minutes, and is difficult only through the trouble experienced in passing the needles through the movable anterior wall, a point wherein all these anterior colporrhaphy operations differ from those on the posterior wall. By pushing the mucous membrane over the needle, as is done in "gathering" linen while sewing, the passage of the suture can be facilitated. The colpoperineorrhaphy, which usually follows this cystocele operation, can now be proceeded with, and the whole combined operation will scarcely exceed one and a quarter to one and a half hour. The after-treatment consists in catheterization every four hours, or the permanent sigmoid or velvet-eye catheter. On the seventh day the suture is cut by simply drawing on the free end and exposing the small loop just below the meatus into which the suture has been tied. Of course, as after all plastic operations on the female genitals, the longer the patient remains in the recumbent position, the firmer the cicatrix and the better the result. I have been so well pleased with this operation that I no longer perform any other.

Operation for Urethrocele.

As already stated, this term designates a sacculation of the urethra alone (see Fig. 296), and produces symptoms and requires treatment peculiar to itself. It may accompany cystocele, it is true, but is then remediable by an operation designed for both conditions.

When occurring alone, as a distinct pathological factor, it produces very aggravating symptoms, the chief of which is painful and difficult micturition. This is due to a retention and decomposition of urine in the urethral pouch, to inflammation of the mucous membrane of that pouch and of the whole urethra, perhaps eventually of the bladder also, and ultimately to a purulent discharge from the urethra. This discharge irritates the meatus and excites the growth of the papillomatous formations known as carunculæ. These latter cannot be cured unless the source of irritation is removed, and then they may disappear spontaneously. I have tried over and over again to cure them by the scissors and nitric acid, and still they returned, until I performed the operation which allowed the pus and irritating urine to escape by another orifice than the meatus, and then they disappeared not to return.

This operation, which we owe to Emmet, consists in making a puncture

or button-hole at the bottom of the urethral pouch, and substituting this orifice for the natural meatus. The urethrocele is forced out through the vulvar cleft by a grooved sound in the urethra, and a slit is cut in its most dependent portion ; the hyperplastic mucous urethral membrane is drawn through this slit with a tenaculum, trimmed down until the urethral canal appears free, and its border is sewed by fine silk or catgut sutures to the mucous membrane of the vagina. This keeps the slit open, which otherwise would contract or become obstructed, and the object of the operation frustrated. Emmet has devised an instrument like a shoemaker's punch, by which he expected to prevent the spontaneous closure of the opening ; but I think he now prefers the slit and suture as described. Of course the slit should not be extended upward so far as to involve the neck of the bladder, for then incontinence would result. The length of the incision should be about half an inch. It should be kept open, and the urethra washed out with tepid carbolized or acidulated water for several weeks, until the urethral disease is cured. The patient has perfect continence ; she merely urinates through the new opening, instead of the meatus, and if she desires, the opening need not be closed at all. Its closure is easily effected by trimming the edges and uniting them by fine wire sutures.

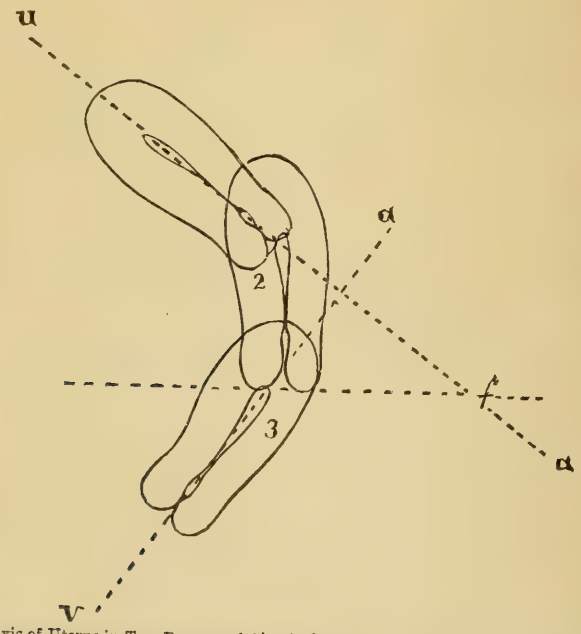


FIG. 306.—Axis of Uterus in Two Degrees of Simple Prolapsus. 1, normal position; 2, first degree of prolapsus; 3, second degree of prolapsus; u a, uterine axis; v a, vaginal axis; p f, pelvic floor (P. F. M.).

OPERATIONS FOR PROLAPSUS UTERI ET VAGINÆ.

The operations for prolapsus of the vagina (rectocele and cystocele) have already been described. Hence it but remains to discuss those forms

of prolapsus vaginæ complicated with descent of the uterus, in which the operative measures for retaining the displaced organs differ from those practised in prolapse of the vagina alone.

Varieties and Degrees.—To prevent confusion in describing and comprehending the principle of the different operative methods, I will briefly enumerate and explain the varieties and degrees of prolapsus of the vagina and uterus.

Prolapsus of the vagina alone, rectocele and cystocele. Both these conditions may exist together, or one only may be present.

Descensus uteri alone, without prolapse of the vagina. Two degrees: 1. Cervix rests on pelvic floor; 2. Cervix at vulva. Ordinarily the books make three degrees of prolapsus uteri, but when the organ reaches the third degree—that is, protrudes from the vulva—the vagina always takes part in the prolapsus.

FIG. 307.—Total Prolapsus of Uterus and Vagina (P. F. M.).

FIG. 308.—Prolapsus of Uterus with Cystocele only (P. F. M.).

Prolapsus or procidentia uteri, with prolapse of one or both walls of the vagina. I have already stated, in discussing the pathological results of laceration of the perineum, that prolapsus of the uterus and the vagina develops in three ways: 1. The vaginal walls, one or both, prolapse first, then the uterus gradually descends, becomes anteverted first if the cystocele predominates then, or at once retroverted, and finally, with the vagina, escapes through the vulvar cleft; that is, the uterus is dragged down by the vagina. In this variety the uterus may be of normal size, or it may originally be or may become enlarged during the process of being dragged down. The two last named conditions are the most common. The cer-

vix, chiefly the supravaginal portion of it, becomes elongated or hyperplastic, and a uterus of two and a half to three inches is drawn out to a length of four to seven inches. A curious phenomenon is then witnessed, namely, that in replacing the uterus and vagina its length at once diminishes to nearly one-half—from seven to four inches, for instance. Emmet very ingeniously explains this by saying that the uterine tissue is ductile, when prolapsed it is drawn out by the traction of the vagina, and when replaced it simply retracts. He calls it the "putty-like" condition. 2. The uterus is subinvoluted, heavy; its ligaments are relaxed, and allow the heavy organ to sag down into the pelvis, and gradually along the axis of the pelvic outlet until it emerges through the vulva, all this time dragging the vagina after it as it descends. Here we have the vagina drawn down by the uterus, and either both walls may be prolapsed, or only one. Thus we will find the cervix with the anterior vaginal wall protruding two inches beyond the vulva, and the posterior vaginal wall nearly in its normal position, admitting the finger two inches or more to the fornix vaginæ; or, what is less common, there is only a rectocele, and the anterior vaginal pouch is preserved. (See Figs. 308 and 309.) 3. Both these conditions, prolapse of the vagina and heavy uterus, may be present and active from the very outset, and the uterus be both dragged down and sagging by its weight at the same time. And I dare say a large proportion of cases of prolapsus are developed by both these two factors of *vis a fronte*, dragging, and *vis a tergo*, forcing.

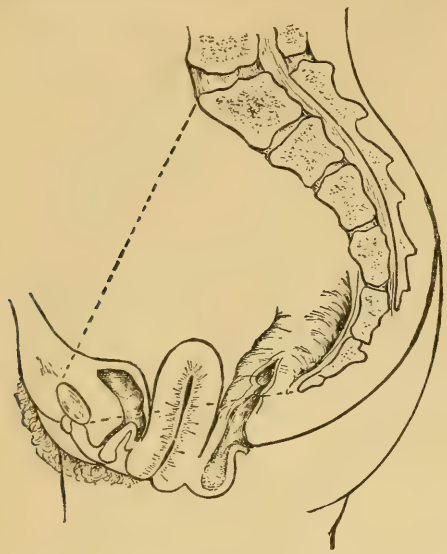


FIG. 309.—Prolapsus of Uterus with Rectocele only (P. F. M.).

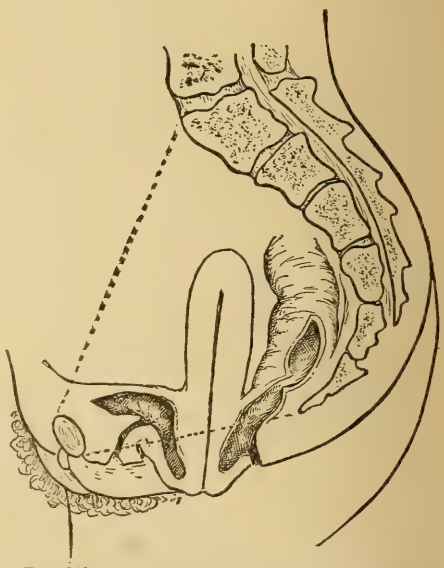


FIG. 310.—Hypertrophic Elongation of Supravaginal Portion of Cervix with Downward Growth of Vagina simulating True Prolapsus (P. F. M.).

A retroverted uterus may occasionally be the means of detaching the vagina and gradually forcing it downward, until uterus and vagina are outside of the body. In such a case the uterus is the primary factor, although the inverted vagina appears at the orifice first. This occurrence is possible only where the vaginal attachments are exceedingly lax, as is the case soon after delivery, and in flabby, debilitated multiparæ.

When a prolapsus has existed for some time the vaginal walls are generally greatly hypertrophied and, as well as the cervix, more or less edematous.

Very commonly the cervix is lacerated, the same parturient factors which overdistended the vaginal walls and ruptured the perineum having also torn the cervix, which becomes everted and enormously hypertrophied. The everted lips gradually become blended with the prolapsed vagina through traction, and the cervical canal is widely patulous.

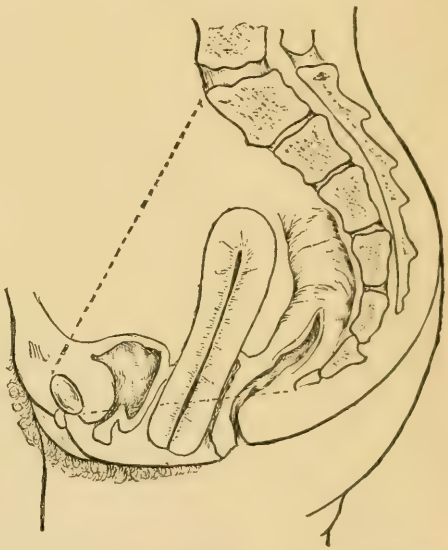


Fig. 311.—Hypertrophic Elongation of Cervix only, simulating Prolapsus Uteri (P. F. M.).

Hypertrophic Elongation of the Cervix with Apparent Prolapse of the Vagina Simulating True Prolapsus.—There is a very common pathological condition which has often been mistaken for prolapsus, and has been described and treated as such by Huguier, Braun and others, who called it "prolapsus uteri without descent of the fundus," which is no prolapse at all, but nothing else than a hypertrophic elongation of the *supravaginal* portion of the cervix, in consequence of which the vaginal walls, being pretty firmly attached to the cervix, are carried down, grow down, in fact, with that organ; the external os protrudes from the vulva more or less, and is on a level with the vaginal wall. The resemblance to true prolapsus is perfect. But the difference is easily recognized by bimanual examination, when the fundus uteri will be found in its normal position above the symphysis; and by endeavoring to replace the uterus, which either will not succeed, or if it apparently succeeds by flexing the uterus, the sound will show the length of its cavity undiminished instead of reduced nearly one-half, as in the ductile uterus of true prolapsus. Besides, a participation of bladder and rectum in the prolapse of their respective vaginal walls is less common in this pseudo-prolapsus than in the true variety. I am aware that there is a difference of opinion as to the manner in which the vaginal walls participate in the cervical hypertrophy; but the process I have described seems to me the most natural and plausible explanation.

The importance of recognizing this spurious variety is very evident when it comes to treatment, both by supporters and the knife, for pessaries are of no use because there is no room for them in the vagina, and the cervix needs to be shortened by amputation to effect a cure of the apparent prolapsus (Fig. 310).

Simple Hypertrophic Elongation of the Intravaginal Portion of the Cervix Simulating Prolapsus Uteri.—Here only that portion of the cervix hypertrophies which is in the vagina, the fornix remaining stationary. A digital examination easily reveals the true nature of the case. Emmet denies the existence of this malformation, but other observers insist upon its occurrence.

While as a rule a uterus, in order to be able to escape through the vulvar cleft, must first be retroverted and its longitudinal axis be in a line with the axis of the vagina, cases do occur where an originally anteflexed, not enlarged uterus, is carried bodily through the vaginal orifice by the descent of the vaginal walls, and the same may happen with a small retroflexed uterus, the whole organ, fundus and all, being outside of the body. The complete prolapse of the whole uterus, so that the fundus is outside of the vulva, is rarely met with except when the uterus is not enlarged (Fig. 311).

Symptoms and Significance.—It is hardly necessary to expatiate at length on the inconvenience which must obviously arise to a woman from a prolapsed vagina and uterus. Not only the presence of a large mass between the labia, which usually becomes ulcerated and the seat of a foul acrid discharge, but the dragging on the pelvic organs (ligaments, bladder and rectum) render a woman suffering from complete prolapsus a confirmed invalid and an object of pity. Even the minor degrees of displacement may make life a burden, and incapacitate the sufferer from pursuing her vocation.

Indications for Operation.—Not every prolapsus justifies an operation. What was said of cystocele in this respect applies fairly well here. First of all, the *minor* degrees of descensus uteri are usually remediable, or susceptible of temporary relief, by supporters ; and the same holds good of many cases of cystocele and rectocele, particularly the former. What operative measures to employ in *extreme* cases of these displacements, and when they are indicated, has already been mentioned. And it will be evident that, precisely the same operative devices as were used for these vaginal displacements will be indicated in cases of prolapsus uteri with prolapse of the vagina.

As a general rule, we may assume that three classes of complete prolapse do *not* indicate operative treatment : 1. When the displacement is recent, and has occurred soon after delivery, before involution has taken place, or in consequence of a sudden violence, such as a strain ; in fact, when the tissues are still capable of restoration to a healthy tone by proper and persistent local treatment and support (astringent tampons, recumbent position, suitable pessaries). 2. When the patient has long passed the menopause and the tissues have acquired the relaxed, atrophic state

peculiar to old age; here an operation would be but temporarily successful, for the cicatricial constrictions of the vagina and perineum would soon stretch, and the prolapse return before the patient has had time to imagine herself cured. 3. When the displacement is such that a safe and simple supporter will retain the prolapsed organs in position, with comparatively slight discomfort to the patient, as is done by a Gehrung pessary in many instances (see page 387), and occasionally by a large hard or soft ring, or a cup and stem supporter. These cases will be found chiefly in women who either will not submit to an operation, or in whom the approach of the menopause renders palliative measures more advisable than radical treatment.

An additional counter-indication against operative treatment for prolapsus might be found in the social condition of many of the sufferers from this affection. To operate on a woman whose poverty requires her to resume, almost before the wounds are firmly healed, the same occupations which first produced the prolapsus (such as washing, carrying water and coal up-stairs, in short, the household drudgery of the poor in all its phases), seems hardly worth the while, for it is but a question of time, short at that, until the displacement returns as badly as before. Such women are most relieved with least trouble and expense by the daily astringent tampon described on page 208.

The cases of prolapsus which distinctly call for operative treatment—that is for *radical cure*, are those occurring in women still in the prime of life, who do not wish to remain invalids for the remainder of their lives, and who are able so to take care of themselves after the operation as to give the wound time to become thoroughly healed. The more the prolapsus seems to depend on a subinvoluted uterus with lacerated cervix, the more the absence of the perineum appears to be chargeable with the prolapsus of the vagina, and the more succulent and healthy the tissues, not only of the prolapsed organs, but of the adjacent parts; the better the outlook from an operative treatment of the several lesions.

Objects of the Operation.—The object in view by an operative treatment of prolapsus uteri et vaginæ are twofold: 1, To reduce the size of the uterus, if it be enlarged, as it generally is; and 2, to retain the uterus as nearly as possible at its normal elevation in the pelvic cavity by constricting the vagina and restoring the perineum, that is, by supplying to the uterus its natural support, the vagina, and to the vagina its physiological pedestal, the perineum.

The first object can be achieved either by palliative local treatment (scarification or leeches to the cervix, intra-uterine applications, astringent tampons, reposition and recumbent position, hot douches), or by trachelorrhaphy, if the cervix is torn, or by both; or by amputation of a portion of the cervix, if it chiefly is hypertrophic.

The second object is secured by anterior and posterior colporrhaphy (already described), either one alone, as the case may require, or both together, and then by perineorrhaphy.

Operations.

The best operation, in my opinion, for prolapsus uteri with cystocele and rectocele (Fig. 307), is a combination of Stoltz's operation for cystocele (see Fig. 304) and the modified Simon's operation for rectocele and perineal laceration, shown in Fig. 289. If the cervix is lacerated, it should first be operated on, the sutures being either catgut, silk, or preferably wire ; the uterus is then replaced, anterior colporrhaphy done, and thirdly and finally colpo-perineorrhaphy.

If but one wall of the vagina is prolapsed, that alone need be constricted, but the perineum will probably always need restoration.

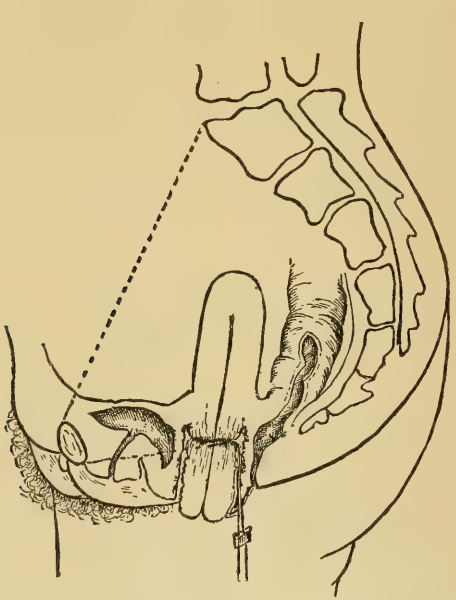


Fig. 312.—Amputation by Galvano-cautery Loop of Hypertrophic Cervix in Prolapsus (real and apparent). The irregular outlines of vagina and portion of cervix to be amputated is intended to show the detachment of the vagina from the cervix by the knife (P. F. M.).

If the cervix is very much enlarged, and even trachelorrhaphy, with ample excision of redundant tissue, seems insufficient, the cervix may be shortened in the following manner : A circular incision is made through the vaginal mucous membrane about half an inch above the external os, and with the scalpel-handle the mucous membrane, including bladder and perhaps rectum, is pushed up until about an inch of the cervix is thus exposed ; the platinum loop of a galvano-cautery battery is then passed around this denuded portion of the cervix ; the wire is slightly sunk by gently tightening the screw, and the cervix is very slowly seared through (Fig. 312). The bladder is in the meanwhile held away by a sound in the cavity. The uterus is then replaced, and the vagina securely tamponed. In due time the slough separates, and the wound cicatrizes, and when this has

taken place it will become apparent whether any additional narrowing of the vagina is needed, for the circular cicatricial contraction of the vaginal vault may have attached the vaginal walls so securely as to prevent their

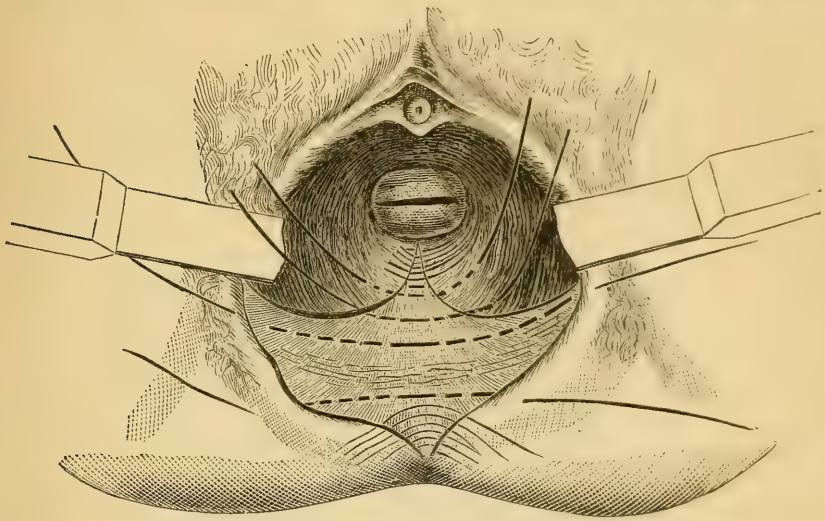


FIG. 313.—Hegar's Denudation for Prolapsus. Front view.

descent. If this method of treatment could be employed in all cases of prolapsus, the results would be much more satisfactory than they are; but it is restricted to those cases where there is little prospect of future parturition, and where the uterus and vagina are both hypertrophied. To produce a circular cicatrix fastening uterus and vagina firmly in the pelvic cavity, besides risking the cicatricial stenosis of the external os so liable to follow the cautery, would hardly be justifiable except in a woman of ad-

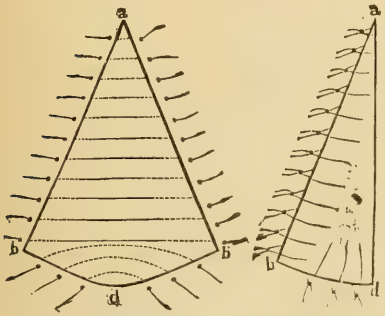


FIG. 314.—Hegar's Denudation for Prolapsus. Front and side view (Fritsch).

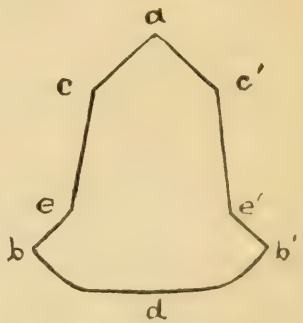


FIG. 315.—Fritsch's Denudation for Prolapsus. According to size of vagina, a d, may measure three to four inches, a b, three and a half inches, b d b, three inches in length (Fritsch).

vanced years. I have had several excellent results, with no drawbacks, in women at or beyond the climacteric period.

Instead of the modified Simon operation for posterior colpo-perineor-

rhaphy, which together with Stoltz's operation has done me very good service, there are several other forms of denudation of the posterior vaginal wall which are highly recommended by their inventors, and I shall briefly describe those which seem to me to offer the best chances for permanent cure, viz., the methods of Hegar, Fritsch, Martin, Bischoff, Neugebauer, and Lefort.

Hegar's method is very similar to that of Simon, with the exception that the denudating on the posterior wall is rather more pointed (Fig. 313 and 314). A reference to the diagrams of these operations will explain their designs better than words. *Fritsch* objects to the pointed shape of Hegar's denudation, and substitutes that shown in Fig. 315, which I decidedly pre-

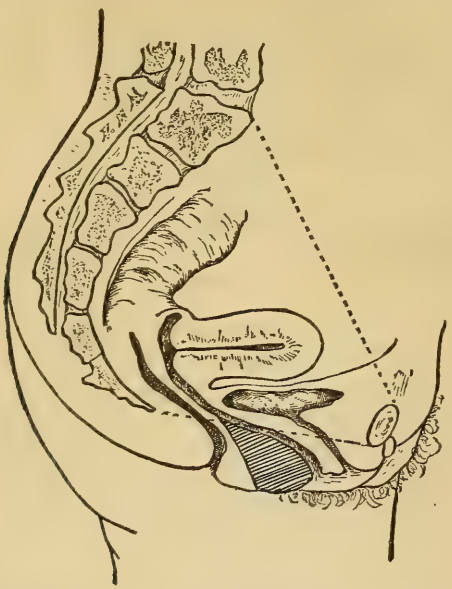


FIG. 316.—Section View of Pelvic Organs with Posterior Vaginal Wall built up by Hegar's Operation. Fritsch says that this smooth triangle in reality becomes puckered from above downward (Fritsch).

fer myself, and which will be seen to resemble very closely that employed by me for the same purpose, and described when speaking of extreme degrees of rectocele (Fig. 289).

The object of *Martin's and Bischoff's* methods is to save the normal central elevation of the posterior vaginal wall, the columna rugarum posterior, and to form two natural lateral furrows. In *Martin's* denudation the raw edges of the two lateral wounds are first united, and the sutures tied and cut short, thus A to A, and B to B, and then the labio-perineal denudation is brought together, thus a to a, b to b, c to c, d to d (Fig. 317).

Bischoff draws down the posterior column of the vagina, dissects off a long tongue-shaped flap extending two to three inches up the canal, and about one and a half inch wide, and then denudes laterally from the middle of each nympha down to the perineum, removing all interven-

ing mucous membrane. The lateral edges of the central flap are then sewed to the edges of the labial wound, first on one side and then on the other, and finally the perineum is closed (Fig. 318). He claims specially

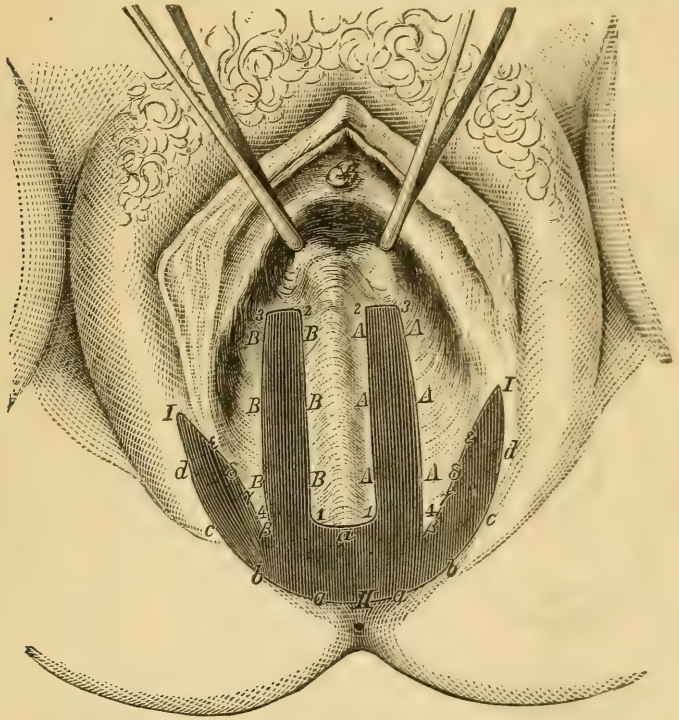


FIG. 317.—Martin's Denudation for Prolapsus. Connecting letters are united.

permanent results from his method. I have never done it, but witnessed its performance twice by an operator who used the knife, which perhaps accounts for the exceeding bloodiness of the operation. Of course, if it appears advisable, anterior colporrhaphy may have preceded any of these posterior operations, although these latter are supposed to suffice.

Neugebauer, of Cracow, claims the method generally known as *Lefort's*, having first performed and described it (after a suggestion of Gerardin in 1823) in 1867, and having had twelve successful cases up to the year 1881. In 1876 Lefort described substantially the same operation, and has succeeded in introducing it under his name. The operation consists in uniting the anterior and posterior walls of the vagina by a longitudinal denudation, thus forming a median septum upon which the uterus rides. Of course subsequent parturition is excluded by this operation, inasmuch as coition is

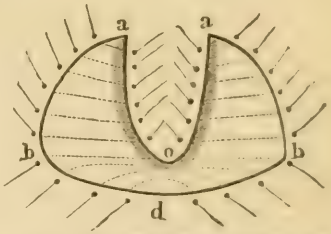


FIG. 318.—Bischoff's Denudation for Prolapsus. a b, a b, surfaces united; o, posterior vaginal tongue.

more or less interfered with. It is, therefore, applicable only to elderly women, whose sexual functions are no longer active. I copy Lefort's description: "The uterus being entirely outside of the vulva, without reducing it, I make on the anterior wall of the vagina, the patient lying on the back, four incisions, cutting out a portion of the mucous membrane which yields me a raw surface about six centimetres long by two wide upon the part nearest to the vulva. Then lifting toward the abdomen the prolapsed uterus, so as to see the posterior face of the tumor, I make on this part a raw surface similar to that on the anterior wall (Fig. 320). That being done, I in part replace the uterus so as to bring the extremities of the two raw surfaces in contact where they are nearest the uterus. I then apply on the transverse border three sutures, reuniting longitudinally the anterior and posterior walls of the vagina; I then proceed to the reunion of the lateral borders by passing from each a silver thread, traversing the border of the anterior freshened surface, then the corresponding border of the posterior freshened surface. A thread being placed in a similar manner on the opposite side and at the same level, it is sufficient to tie these sutures to increase by the apposition of the opposite vaginal walls the reduction of the uterus. This reduction is completed gradually as the sutures are put in place, and when the two raw surfaces have been united throughout their extent, their reduction is complete (Fig. 321). The threads which have served as sutures for the transverse border nearest the uterus being hidden in the depth of the vagina, are difficult of access when after several days union is effected; therefore it is wise to give to these threads sufficiently great length in their twisted part, in order to seize them easily when they become free after section of the part embraced in their loops."

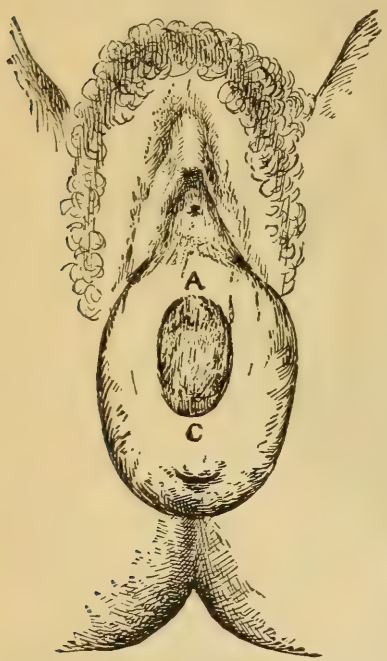


FIG. 319.—Lefort's Method for Prolapsus. Denudation on anterior vaginal wall (P. F. M.).

The *Accidents* following these prolapsus operations are similar to those outlined as occurring after ordinary colpo-perineorrhaphy, with slightly greater probability in accordance with the greater extent of the denudations for prolapsus. Hegar mentions three cases of secondary arterial hemorrhage, two within the vagina, and one at the entrance, occurring six hours and twelve days, respectively, after the operation, and therefore now ligates larger arterial branches which may be divided. Vaginal hemorrhage (which must not be mistaken for the menstrual flow, or the reverse) must be arrested by astringent injections, and if uncontrollable, by open-

ing the wound and ligating the bleeding vessel. I should prefer loose tamponade before resorting to that extremity.

Catarrh of the bladder would not be uncommon, if the precaution were not observed always to introduce the catheter by the eye, after thoroughly cleansing the vestibule. If the patient can urinate herself, it is just as well to let her do so, merely irrigating the vagina and vulva afterward.

Hegar reports two deaths from pyemia and septicemia out of one hundred and sixty clinical operations, and attributes their occurrence to the presence of septic cases in the clinic at the time.

Permanency of Results.—The number of operations devised for prolapsus indicates the one great weakness of all these methods, namely, the gradual stretching of the adhesions and eventual return of the displace-

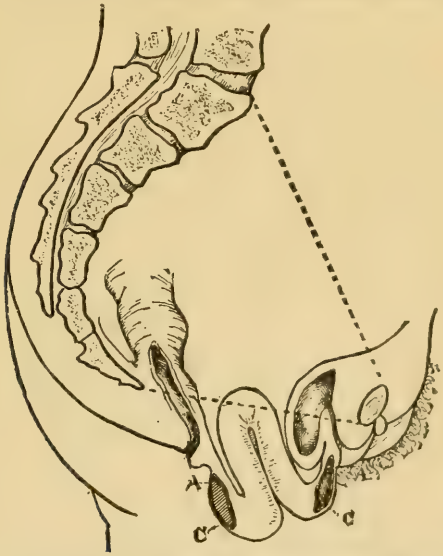


FIG. 320.—Section View of Denudation. A C, on anterior and posterior vaginal walls (after Lefort's method.)

ment. Of course it is impossible by an operation (at least through the vagina; that of sewing the fundus of a prolapsed uterus to the anterior abdominal wall has been proposed, but has scarcely become popular as yet, even in this age of laparotomies) to fix the uterus itself in its normal position. All we can do is so to strengthen the lower supports of the uterus, the vagina and its pedestal, the perineum, as to prevent these parts and the uterus from sinking down again. The operation, therefore, which best accomplishes this purpose is the one to be selected. The choice seems to me to lie between the methods of Simon, Hegar, and Fritsch. Hegar says that he has found many of his cases still perfectly well from four to ten years after the operation, although occupied in hard corporeal labor. Bischoff reports similar results. I have several as long as two to five years. Of course, the longer the patient can retain the recumbent position and abstain from exerting herself, the stronger becomes the cicatrix and the more permanent will be the result.

Parturition will naturally be the severest test to which these operations can be put, and many, probably the majority, will succumb. It is hardly to be expected of an artificially constricted vagina that it should withstand agencies which a healthy primiparous vagina is unable to resist, and hence it is not to be wondered at if a relaceration or permanent relaxation of the vagina and perineum occurs during delivery. The surgeon should warn the patient of this danger, and advise her to avoid the risk of parturition for several years at the least, and if the event does present itself,

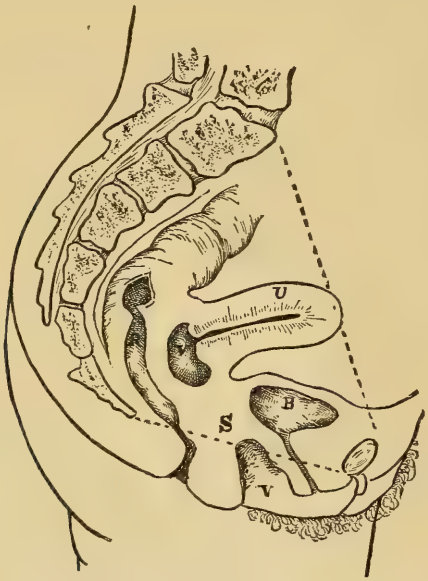


FIG. 321.—Section View of Vaginal Septum formed by Lefort's Operation as for Prolapsus Uteri.

to secure competent assistance during delivery. Hegar says that "a subsequent confinement has in the majority of his cases not caused a relapse. Of eleven operations of whose subsequent labors he received information, only in two instances did a relapse occur." I have no experience in this respect after prolapsus operations; but in several cases of secondary perineorrhaphy I have succeeded, by the liberal use of vaseline and gradual preparatory dilatation of the perineum with the fingers, and by gently and *slowly* guiding the face over the perineum with two fingers in the rectum, in preventing a relaceration. I am always particular to caution my patients to avoid putting the perineum to the test in less time than two years after the operation.

List of Gynecological Instruments for Office Use and for Minor Operations.

I. *Set for Office Examinations and Ordinary Use.*

1 Mundé's flange Sims' speculum.
1 Vaginal Sims' speculum.
3 Cylindrical hard-rubber or glass (Ferguson's) specula, small, medium, and large sizes.
1 Sims' depressor, with handle.
1 Curved uterine dressing-forceps, with catch.
2 Right-angle tenacula.
1 Simpson's sound.
1 Emmet's pure silver probe.
1 Emmet's repositor.
1 Mundé's cervical mucus syringe.
4 Mundé's hard-rubber curved applicators.
1 Mundé's applicator-syringe.
4 Straight hard-rubber screw sticks.
1 Sims' hard-rubber slide applicator.
1 Mundé's uterine pencil-tube.
1 Buttles' scarificator and caustic holder.
1 Bangs' small dull curette.
2 Thomas' dull curettes, larger sizes.
2 Mundé's sharp curettes, medium and large size.
2 Mundé's large dull placental curettes.
1 Mundé's placental forceps.
1 Palmer's uterine dilator.
6 Albert Smith's retroversion pessaries, assorted sizes.
6 Mundé's bulb retroversion pessaries, assorted sizes.
3 Thomas' open-cup, anteversion pessaries, assorted sizes.
3 Gehrung's cystocele pessaries, larger sizes.
3 Glass plugs, different sizes.
1 Dozen tupelo tents, assorted sizes.
1 No. 10 English or velvet-eye rubber catheter.
1 Powder Insufflator.
Iodoform; absorbent cotton; tampons; alum-glycerine, 1 to 8; tincture of iodine, pure and compound; concentrated solution of carbolic acid; glycerine; vaseline.

II. *Roll of Instruments for Minor Operations, chiefly Laceration of Cervix and Perineum.*

2 Emmet's small curved cervix scissors, right and left.
2 Emmet's perineum scissors, right and left curve or flat.
1 Emmet's or Sims' needle-holder.

2 Solid steel cervix operation tenacula.
1 Mundé's counter-pressure hook.
1 Emmet's wire twisting forceps.
1 Sims' shield.
1 Thomas' tissue-forceps.
1 Long straight scissors.
1 Stout wire scissors.
6 Schnetter's cervix needles, long and short.
6 Sims' cervix needles, long and short.
12 Straight darning needles, for perineum.
3 Long Koeberlé's pinces hemostatiques.
3 Short Koeberlé's pinces hemostatiques.
12 Metal sponge-holders.
2 Right angle tenacula.
1 Uterine dressing-forceps, with catch.
1 Simpson's sound.
1 Mundé's sharp curette.
1 Buttles' scarificator.
1 Sims' uterotome.
1 Palmer's uterine dilator.
3 Glass plugs.
1 Long-handled bistoury, straight, blunt point.
1 Long-handled bistoury, sharp point.
One-half dozen tupelo tents.
Braided silk, three sizes; catgut, three sizes.
Pure silver wire, four coils, Nos. 26 and 27; one coil, No. 33.
A dozen common fine carbolized sponges, well cleaned.

To be Carried in Satchel with above Roll.

1 Mundé's short, flat, broad, Sims' speculum, for operations.
1 Ordinary Sims' speculum.
1 Short-handled depressor.
1 Elastic catheter.
1 Ether-inhaler and Squibb's sulphuric ether.
Vaseline; carbolic acid; alum-glycerine; finely powdered iodoform in insufflator; half a dozen nitrite of amyl pearls.

III. *Gynecological Satchel with Instruments for Examinations and Ordinary Treatment.*

1 Mundé's flange speculum.
1 Depressor.
2 Curved catch dressing-forceps.
2 Examining tenacula.
2 Curved rubber applicators.
2 Straight rubber sticks.

1 Slide applicator.
2 Thomas' dull curettes, 2 sizes.
2 Mundé's sharp curettes, 2 sizes.
2 Mundé's placental curettes.
1 Mundé's placental forceps.
1 Hinged Simpson's sound.
1 Palmer's dilator.
1 Uterine scarificator.
1 Glass or hard-rubber cylindrical speculum, medium size.
6 Retroversion, 3 anteversion pessaries, different sizes.
1 Insufflator filled with iodoform.
Absorbent cotton ; string tampons ; disk tampons.
6 Bottles in boxwood cases, containing glycerine, vaseline, alum-glycerine (1:8) ; carbolic acid, tincture of iodine, solution of the persulphate of iron.

IV. *Pocket-case for Examinations and Applications.*

1 Dawson's double-hinge Sims' speculum.
1 Double depressor.
2 Tenacula.
2 Mundé's hard-rubber applicators.
2 Straight hard-rubber sticks.
1 Curved catch dressing-forceps.
Absorbent cotton ; tampons.

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